UNIVERSITÉ DE NEUCHÂTEL

Learning from Others: *Emotion Appreciation* and the Informative Case of Interest

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Thesis submitted in partial fulfilment of the requirements for the degree of
Docteur en Sciences Humaines
Orientation: Psychologie

Cognitive Science Centre
Faculty of Humanities

June 9th 2017

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Neuchâtel, le 9 juin 2017

p. o. Le doyen
Hédi Dridi

SUMMARY

This thesis concerns emotion recognition. More precisely, it concerns how we recognise how other people are feeling and how they are likely to act as a consequence.

The introduction considers the orthodox approach to emotion recognition which focuses on facial expression and explains why this can only be a part of the story. In short, if emotions are relational, and, as such, describe the relation between the person and the object they are looking at, then facial expression is only one piece of evidence, among many, that can be used to infer how the other is feeling and what they are going to do next.

In chapter 1 (taken from Clément and Dukes, 2013), I point out that there are a number of similar terms that are used to describe inter-relational instances of emotion recognition, instances when onlookers can use the information in the emotional expression for themselves. One example, social referencing, describes how children as young as 12 months old can use the affective information provided in the expression of an other as a guide to how they themselves should behave – whether they should cross a *visual cliff* or not. In chapters 2 and 3 (taken from Clément and Dukes (2017) and Dukes and Clément (2017) respectively, I distinguish between social referencing and another phenomena, social appraisal, and place them at the heart of a new concept, affective social learning, that brings together various types of such phenomena. In short, while social learning describes how we can use others' actions to learn how to *use* an object, affective social learning describes how we can use others' expressions to learn how to *value* an object: should I be frightened of the dog if Sarah is, should I be disgusted by the joke if Deborah is? And this learning can be transgenerational - a conduit for the transmission and perpetuation of cultures of value. For example, if a child is in a football-loving family, a racist family, or a devoutly religious family, the child could pick up on how the family members feel about these 'objects' to learn to appreciate football, hate foreigners or to love a particular deity. In short, picking up this type of affective information about how to value the objects in our environment must be, I argue, more subtle than focusing on facial expression.

Having shown, through the example of affective social learning, how the explanatory power of emotion is increased when emotion recognition is considered in this novel way, in Chapter 4 (taken from Reschke, Walle and Dukes, 2017), attention turns here to social cognition. Taking three classic developmental social cognition experiments, I argue that the reported behaviour of the children might be better understood if we consider their appreciation of the relations between the person and the objects and her goals. For example, while it has been shown that 18-month olds will help people open cupboard doors, they may do this because they have understood that the person is frustrated – particularly when the person knocks up against the wardrobe in a repetitive manner while their arms are full of books.

Having argued in chapter 1 that the emotion of interest might play a particularly important part in how we learn from others about the value of the objects in our environment, Chapter 5 (taken from Dukes, Clément, Audrin and Mortillaro, 2017) provides evidence that

it is only possible for adults to recognise interest in others when the interest is expressed dynamically (in short films) or, even more successfully, when the expression is presented in whole-body form. In other words, and in line with a host of previous evidence in the literature, a static, facial expression of interest is very difficult to recognise without further clues. In chapter 6, we use this information to test how the expression of interest in an adult affects how infants behave. While children aged 9 months seemed insensitive to the expression, 12-month-olds were significantly more likely to choose an object that had previously been looked at with interest rather than one that had previously been looked at with distinterest. Surprisingly, children aged 15 months were significantly more likely to choose the object that had previously been looked at with disinterest.

The thesis concludes by asking how far this idea of using a more relational approach to emotion recognition can go, and whether it would be possible to include other social relations (for example, competition, dominance, cooperation) in the environment to create an even more holistic approach.

Keywords: emotion, emotion recognition, affective social learning, socialization, interest

RÉSUMÉ

Cette thèse porte sur la reconnaissance des émotions. Plus précisément, elle s'intéresse à la manière avec laquelle on parvient à percevoir les sentiments des autres et la manière dont ils sont, par conséquent, susceptibles d'agir.

L'introduction explique en quoi l'approche orthodoxe de la reconnaissance des émotions qui se concentre sur les expressions faciales n'est pas exhaustive. En bref, si les émotions sont relationnelles et décrivent par conséquent la relation entre la personne et l'objet qu'elle regarde, alors l'expression faciale n'est qu'un élément de preuve parmi d'autres moyens qui peuvent être utilisés pour comprendre les sentiments de l'autre et sa manière d'agir ensuite.

Dans le premier chapitre (pris de Clément and Dukes, 2013), je mets en avant le fait qu'il existe plusieurs termes similaires pour décrire des situations interrelationnelles de reconnaissance des émotions, situations durant lesquelles le spectateur peut utiliser pour lui-même des informations émanant de l'expression émotionnelle d'autrui. Pour donner un exemple, *social referencing* décrit la manière avec laquelle des enfants dès 12 mois peuvent utiliser une information affective décelée dans l'expression de quelqu'un d'autre pour les guider quant à la manière dont ils doivent eux-mêmes agir. Dans les chapitres 2 et 3, (pris de Clément and Dukes, 2017 et Dukes and Clément, 2017), je fais la distinction entre le *social referencing* et un autre phénomène, *social apprasial*, et je les place au cœur d'un nouveau concept, *affective social learning*, qui rassemble plusieurs variations de ce même phénomène. En résumé, au même titre que *social learning* décrit la manière dont on peut

utiliser les actions d'autrui pour apprendre à utiliser un objet, *affective social learning* décrit la manière dont on peut utiliser les expressions d'autrui pour apprendre la valeur de l'objet : dois-je avoir peur du chien si Sarah en a peur, devrais-je être dégoûté par cette blague si Deborah l'est ? Et cet apprentissage peut être transgénérationnel – un canal de transmission et de perpétuation de valeurs culturelles. Par exemple, si un enfant grandit dans une famille qui adore le foot, dans une famille raciste, ou une famille très religieuse, l'enfant pourrait alors s'appuyer sur les sentiments des membres de sa famille à l'égard de ces « objets » pour apprendre comment apprécier le football, détester les étrangers ou adorer une certaine divinité. Mon argument est que parvenir à capter ce type d'information affective sur la valeur à accorder à certains objets dans notre environnement ne peut pas reposer uniquement sur la perception de l'expression faciale.

Dans le chapitre 4 (pris de Reschke, Walle and Dukes, 2017), je mets en avant une autre manière dont cette approche de la reconnaissance des émotions peut accroître le pouvoir explicatif des émotions. Ayant précédemment montré que c'est le cas pour l'apprentissage social, l'attention est ici portée sur la cognition sociale. En abordant trois expériences classiques sur le développement de la cognition sociale, je démontre que le comportement des enfants ayant été décrit par les auteurs peut être mieux compris si l'on considère leur manière d'appréhender les relations entre la personne et l'objet, ainsi que ses buts. Par exemple, alors qu'il a été démontré que des enfants de 18 mois pouvaient agir d'une manière que l'on pourrait qualifier d'altruiste en aidant d'autres personnes à ouvrir la porte d'une armoire, il se pourrait qu'ils le fassent parce qu'ils ont compris que la personne était frustrée – particulièrement lorsque la personne cogne la porte de l'armoire de manière répétitive en tenant dans ses bras une pile de livres.

Ayant défendu dans le premier chapitre que l'émotion de l'intérêt pourrait jouer un rôle particulièrement important dans notre manière d'apprendre par le biais des autres la valeur des objets de notre environnement, le chapitre 5 (pris de Dukes, Clément, Audrin and Mortillaro, 2017) prouve qu'il n'est possible pour les adultes de reconnaître l'intérêt chez les autres que lorsque l'intérêt est exprimé de manière dynamique (dans des films courts) ou, encore mieux, lorsque l'expression est montrée avec le corps présenté en entier. En d'autres termes, et cela confirme ce que l'on peut déjà trouver dans la littérature, une expression faciale statique de l'intérêt est très difficile à reconnaître sans l'apport d'autres indicateurs. Dans le chapitre 6, nous utilisons cette information pour tester comment l'expression de l'intérêt chez un adulte influence le comportement du jeune enfant. Alors que les enfants de 9 mois semblent indifférents à l'expression, les enfants de 12 mois avaient significativement plus tendance à choisir un objet qui avait précédemment été regardé avec intérêt plutôt que celui qui avait été regardé avec désintérêt. Étonnement, les enfants de 15 mois avaient significativement plus tendance à choisir l'objet qui avait été regardé avec désintérêt.

La thèse se conclut en demandant jusqu'où une approche plus relationnelle de la reconnaissance des émotions peut aller et s'il est possible d'inclure d'autres types de relations sociales (par exemple, la compétition, la dominance, la coopération) pour créer une approche encore plus holistique.

Mots-clés: émotion, reconnaissance des émotions, *affective social learning*, socialisation, intérêt

Pour Romaine, bien évidemment…

…and for my two favourite distractions, Samuel and Ike.

ACKNOWLEDGMENTS

I started working on this thesis in December 2011 and here I am, more than 5 years and a Californian suntan later, with a finished product. I have a great deal of people to thank because I have worked in four very different environments in the last 6 years, with great people in each.

However, I would like to start with the members of the thesis committee and, firstly, with its most important member, my supervisor, Professor Fabrice Clément. Fabrice has obviously been both an inspiration to me and a great help. His breadth and depth of knowledge across disciplines is awe-inspiring. In his spare time, Fabrice is a long-distance runner. Although writing the thesis has felt rather like a sprint at times, it has actually been much more like a marathon, and it is likely to be the only one I will ever do. Thank you Fabrice for all your support, friendship and guidance. I hope that we will be able to continue working together, developing our shared research interests.

I would also very much like to thank Professor Joseph Campos. Not only did Joe put me up in his Infant Studies Lab in Berkeley but he also put up with me (and my family) for a year. Joe's empirical and theoretical work on emotion and emotion development has been a real inspiration to me. Our discussions in the sunshine in Berkeley at Pat Brown's convinced me very quickly of the value of taking a functionalist view of emotion, and his knowledge of the machinations of the emotion research community were both entertaining and informative. Not only that, but Joe and his wife Rosemary were extremely kind to us during our stay, inviting us for numerous day trips and holidays. Our boys grew quickly fond of both Joe and Rosemary and we share many happy memories – particularly of Yosemite Park and the USS Hornet. They were remarkable, generous hosts and Romaine and I will be forever grateful. Thank you Joe and thank you Rosemary.

I have known Professor David Sander for longer than the other members of the jury. David and I worked together on an earlier project and, while providing support for me during a very difficult transition period, he ultimately put Fabrice and me into contact with one another. He also provided me with a letter of reference for my application for the Doc.Mobility that led to my time in Berkeley. David's work on appraisal theory has been a great source of inspiration, particularly his wonderfully simple demonstration that how people judge a facial expression is sensitive to the eye gaze direction. It is in such beautifully simple experimental designs that we often can get a better understanding of how things actually are. How he manages to run a happy, effective, productive research lab while being director of the Swiss Center for Affective Sciences is a never-ending source of wonder to me.

Finally I would also like to thank Professor Antony Manstead for accepting to be part of the jury. Not only has Tony's research on social appraisal obviously provided much of the inspiration for this thesis, but he has also provided personal encouragement by reviewing the article featured in the second chapter, writing a commentary on the third, showing interest in the posters I have presented at various academic meetings, finding a place for me in a symposium in others and by offering career advice. He has therefore been very present

in my development as a researcher and I am delighted that he agreed to be a member of my jury to continue his criticism and encouragement through to the end of this process.

As the reader will appreciate, I am grateful to all the members of the committee not only for the inspiration their work has provided, but also for their kindness.

I would also like to thank the members of Fabrice's research team (past and present) who helped me focus on my work and have helped me forget it in equal measure. Nathalie, Amélie and Stéphane were there on my first day. NatNat was an ever-present in the office, La Desche was there less often (but she made more noise than NatNat when she was there!) and when Stephane was there, it felt like the team was complete and we could, at last, open the (first) bottle of wine.

Later, Nadège and Marco arrived to work directly on the interest project. I have calculated that for the purposes of one experiment, Nadège actually had to look interested for a total of 1,888 seconds – that means we have photographic evidence that she looked interested for nearly 32 minutes during her time spent on the project. Thanks Nadège. And thanks Marco, too. It was very sad to see a footballer come to the end of his career, but as one activity comes to an end, a new beginning can start – congratulations on your new sporting career – Xtreme cake decoration. Forza!

Another Italian cake decorator I would like to thank is Federico Lauria. When he is not putting the finishing touches to a mille-feuille, Federico is thinking deep thoughts about emotion and death. Federico and I spent long hours talking about interest and emotion in libraries, cafés, trains and bars. My only regret is that I didn't get his recipe for strawberry cheesecake before he left Europe, like so many Italians before him, in search of the American dream.

I also would like to thank Colin for providing some intellectual stimulus in the train from Neuchâtel to Lausanne or to Payerne or to Yverdon or to Montreux or to wherever it was that he was partying that evening. I hope to see you soon in Berlin! An enormous thanks also to Thierry Raeber who helped me remember that, while researching emotion is absolutely vital for the future of humanity, world peace should be thought about too, now and again. Thanks very much Thierry and !tł€½←ß!, I think you'll agree!

There are many other people that I would like to thank for their support and good humour at Neuchâtel including Hugo who read my initial thesis project and Laurent, Delphine, Cristina, Romain B, Magali, the other Romain B, Camillia, Louis, Letizia, Steve, Rachel, Fabienne, Marion and José. Thanks to you all.

My time in Berkeley was very interesting and my two windows in the office were named Randy and Abbey. Thanks guys for letting me know what was going on out there! My colleague in Berkeley, Minxuan He, deserves special thanks too for welcoming me so warmly to the lab and letting me know how things work, especially at such a complicated time for her. I would particularly like to thank Eric Walle at UC Merced for his welcome and for our discussions about life, work and craft beer. Eric is a friend and colleague and I look forward to continuing to learn from him and hope to see him for a beer in Europe soon! I am also very grateful to Alex for her generous hospitality and particularly her patience with

the boys. And a big thanks, too, to Peter for his patience with me and good humour, particularly concerning the seemingly never-ending last minute changes to manuscripts.

In Geneva, there are also many people to thank but this section is already much longer than I expected! The people at the Swiss Center for Affective Sciences have been of vital importance to me during the thesis, informing my thoughts and providing technical expertise. Marcello Mortillaro should be thanked in particular for getting us over the line with the 4-conditions paper and for helping me through the FACS qualification. I hope to spend the next few seasons in his company, at least until Aberdeen win the Champions League. Catherine Audrin joined me in several projects, the weirdest of which was probably on women's employment prospects as a function of their hair length. Catherine is brilliant and always good fun. She does swear a lot though! Julien Deonna has also been of great support, especially in the final stages of writing. His philosophical understanding can only be matched by his patience and warmth in encouraging me to think more clearly about what I want to say. Cristina S has also always been an important colleague for me and she probably deserves more thanks than she gets from every doctorate student and postdoc that passes that way. Daniela and Marion too have been amazing and managed to make me feel at home whenever I made it to CISA, in spite of the infrequency of my visits. And by 'at home', I mean that they are perfectly happy to insult me. Thanks too to Ben and Christian for the companionship throughout our theses and beyond and to Tris and Richard for helping me think straight.

In another part of Geneva, on another project, I would like to thank, Bron, Marie-Christine, Sonia, Hilary and Martina for their help and particularly Martin, who has to share some of the credit and blame, in equal measure, for convincing me that I would find research an interesting way to live my life!!!

It would be remiss of me not to thank all the children and their parents who participated in the study discussed in chapter 5. All of them were volunteers that we had contacted through local media and through the birth announcements in the local press. Some of them travelled for a long time in order to participate and some of them even came back on multiple occasions. Thanks to all of them. Also, I should thank the Swiss National Science Foundation who not only provided me with my salary for the first three years via Fabrice and the NCCR, but who also provided the funding for my family and me to spend the year in Berkeley.

On a more personal note, I really want to say thanks to my very own living Benetton advert – Maude, Debs and Sarah. Thanks guys for everything. Your professional support at a difficult time and our on-going friendships mean a lot to me. My 'besties' need thanking too - not that they have been helpful in any way, shape or form with the writing of the thesis, but because sometimes sharing a laugh and a bottle of wine helps. Thanks for everything, Ali, Chantal, Jason, George, my sister Ruth, and her husband Dom.

Thanks too, must go to my parents-in law, Jean-Paul and Evelyne. They have been very understanding about the number of times I haven’t been able to make it ‘back home’ to the Valais because of work I had to finish. Of course, on the occasions when I have been able to make it, their hospitality has been fantastic.

As for my parents, they have provided both great emotional and financial support and have even done some proof reading for me. Thank you, both of you. While I am sure you both would have loved to have been in a position to be more hands-on, particularly with the children, please don't underestimate how grateful I am for everything. I love you both dearly. Needless to say, Gilian has been amazing too, tirelessly taking care of us all when we are in her company, whether in Scotland or Switzerland, focusing on the kids when Romaine and I most needed a break. Thanks Gilian. Cath too has been great, and I have enjoyed our chats about psychology, history, revolution and chocolate. Thanks Cath.

Finally. I really should thank Samuel and Ike, my two boys, for insisting that I play with them when I feel too tired, for making me read to them when I am trying to correct someone who said something wrong on the Internet, and for generally providing me with perspective on what can become the overwhelming experience of writing a thesis. Thanks boys. But most of all, more than anyone, I would like to thank Romaine for her help, her understanding, her patience and her love. I think the best thing I can do to repay you for everything Romaine, is to promise you that I will never, ever, do another thesis.

Danny
Lausanne, April 2017

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PREAMBLE

Before becoming a researcher I worked in various psychiatric institutions as an educator and latterly as a psychologist. Most of my experience was obtained at an institute in Lausanne where the patients and staff lived together (and where the distinction between the groups, it seemed, was sometimes blurred). The patients lived, for the most part, in secure housing and were offered various activities throughout the day such as classes in ancient languages, history, theatre and art history and where they could participate in activities, for example rowing, craft and music as well as more explicitly 'health care' activities**:** psychotherapy, psychodrama, sophrology and psychomotricity. Winter holidays were taken in the Alps**,** while a month was spent in the summer on the Mediterranean. I was the *responsable* of the secure housing, living in one of the houses and teaching and taking part in the various classes.

Each week began with a meeting for staff and patients alike, where any timetable changes concerning the activities were explained, correspondence was read out and any other general information was shared. It was during one such meeting that an announcement was made that the founder of the institution had passed away during the night. Some of the staff and patients had known the founder for over 35 years and were understandably very saddened by the news. One of the patients, Claire, began laughing hysterically and couldn't stop, while at the same time saying, "It's so sad, it's so sad."

If Claire's reaction to the news stays with me to this day, it is mostly because of the juxtaposition of her declaration of sadness with an expression most often related with happiness, but it was also the look in her eyes, searching desperately, it seemed, for someone to recognise her sadness, or to help her express it correctly. Needless to say, I was not the only one to have seen Claire's reaction and it became part of a general lesson on emotion and emotion regulation in schizophrenia**,** during the next staff meeting. The discussion of Claire's

behaviour was initially described as inappropriate, but questions were asked about whether or not Claire was expressing, better than anyone, the ambivalence we can feel when someone dies, depending on our relationship with the person and whether or not they had been suffering, for example.

Whatever the reason for Claire's reaction, this anecdote is intended to underline how the opportunity to prepare a thesis has helped me develop my interest in emotion and to serve as an introduction to the main themes found in this thesis – emotion, inter-personal relationships, context, learning and interest, particularly from the third-person point of view. The title of this doctorate is "Learning from others: 'Emotion appreciation' and the informative case of interest" and includes the name I have given to the approach to emotion recognition that we have adopted throughout the thesis – emotion appreciation. This approach has been identified post-hoc. In other words, we did not set out to test this approach. Rather, I realised what we had done as I was searching for a thread to draw the chapters together. The reader should not then expect a new, fully developed theory of emotion or, indeed, of emotion recognition, but rather a tentative description of a new approach that, I argue, appears to open up new possibilities for research, exemplified in the subsequent chapters presented here.

CHAPTER 1

INTRODUCTION

This thesis is fundamentally about emotion recognition: specifically, it concerns how third-party observers infer what someone else is experiencing and how they are likely to behave as a consequence. A new approach, called *emotion appreciation*, will be outlined, which is largely consistent with previous research on socio-emotional processes within an appraisal theory framework (Campos, Mumme, Kermoian & Campos, 1994; Dewey, 1895; Frijda, 1986; Manstead & Fischer, 2001). It will be argued that the adoption of this new approach can open up new frontiers for research in affective science, shedding new light on the old problem of how we use other people's affective reactions to infer information about the person, the object[1] they are attending to and as guides to regulate our subsequent behaviour. Evidence for this will be provided throughout the thesis by two principal means; firstly, social learning and areas of social cognition will be shown to be enriched by adopting this new approach, while secondly, in a demonstration of how an *emotion appreciation* approach can be applied, expressions of interest will be shown to be just as readily identifiable as expressions that are more generally considered to be representative of emotions. This is important because there is some debate as to whether interest qualifies as an emotion among affective scientists and it is likely that it is the 'lack of recognisability' that leaves certain researchers sceptical. Finally, it will be shown how children as young as 12 months old use third-party expressions of interest to regulate their behaviour, suggesting that, within certain conditions, even young infants can recognise other people's interest.

The theoretical and empirical focus of this thesis then, is more to do with occasions when the person is unaware that they are being observed than on occasions where there is interaction between two people. Furthermore, the effects that culture can play in determining how we infer emotion from others' actions will only be mentioned in passing and while examples of emotion appreciation as employed by children is described in several of the chapters, nothing will be said about how emotions develop. This thesis then, is principally concerned with what the observer

[1] The word 'object(s)' in this thesis should be understood in terms of a physical object, an event, an idea or concept, a

infers from the expression (the receiver question) rather than the processes that produce the expression (the sender question) (Frijda & Tcherkassof, 1997).

The introduction is split into three sections. In the first section, the theme of emotion recognition will be introduced and certain challenges to the orthodox method of considering emotion recognition will be presented. A first challenge to the nature of the focus on facial expression orthodoxy, based in the appraisal school of emotion research, will be described, although, as I will argue, ultimately this challenge is subject to some of the same criticisms as the orthodox method. In light of these limitations, the need for a new approach is highlighted and this new approach will be outlined here. The recognition and power to regulate behaviour of expressions of interest will be discussed in the second section. Finally, the third section outlines the structure of the thesis and relates the questions that arise from the introduction to the answers that are provided in the subsequent chapters.

1.1. Emotion Recognition

The story goes that Silvan S. Tomkins, the renowned social and personality psychologist, had convinced two junior colleagues of the possibility that there were a small number of emotions that could be universally recognised by their facial expression alone. Apparently, both men set sail in search of proof without knowing that the other had set off at the same time, to test the same theory, with largely the same stimuli. Paul Ekman left for New Guinea, Borneo, Brazil and Japan (Ekman, Sorenson & Friesen, 1969) and Caroll Izard tested American, European, Indian, Japanese and African subjects[2] (Izard, 1971; as cited in Izard, 1994), each with static photographic headshot images of actors expressing anger, contempt,

[2] Some of the Japanese and African subjects were tested in Paris in French, in spite of the fact that French was only their second or third language.

disgust, fear, joy, interest, sadness and surprise[3]. The results were mixed, and in their search for universality, while Izard felt he had collected enough evidence to include interest and contempt in his basic set of emotions, Ekman did not.

This research has gone on to frame much of affective science and debate continues to this day about the exact number and types of emotion that can be recognised universally from the face (Matsumoto, Keltner, Shiota, O'Sullivan & Frank, 2008). In 2011, Ekman himself described 22 families of emotions for which there was some proof of universality including emotions such as contempt, *schadenfreude* and perhaps embarrassment (although the fact that blushing is not visible in dark-skinned people, "depriv[es] this emotion of a universally recognizable signal" and as such cannot be considered an emotion), but he still found no place for interest (Ekman & Cordaro, 2011, p.366). Izard, for his part, now includes 12 fundamental emotions that he argues can be universally recognized in infants, having added shame, guilt, shyness and 'self-hostility' (Boyle, Helmes, Matthews & Izard, 2015). Meanwhile, researchers continue to argue about whether or not their favoured emotion meets the criteria for a universally recognisable basic emotion (e.g. awe – Shiota, Campos and Keltner, 2003; and pride - Tracy and Robins, 2004, 2008a).

But there is evidently more to this type of theory than just adding to**,** or subtracting from**,** the list of emotions. In the first section here, I will outline Ekman's theory of emotion, so pervasive now as to be called the orthodoxy, and highlight its limitations, particularly concerning emotion recognition. In the second section I will present a new solution that appraisal theorists suggest to overcome some of those limitations. In the third section, the importance of context will be underlined, which, I will argue, is not sufficiently taken into account by the orthodoxy or the appraisal alternative. Finally, I will outline a new approach,

[3] This history is necessarily brief and is not comprehensive. For example, Ekman also filmed the reactions of tribesmen in Papua New Guinea when hearing a particular scenario e.g. a dead pig on the ground). Their reactions were recognised by US citizens. Similarly, the tribesmen could identify the facial reactions of the US citizens (Izard, 1971; as cited in Ambady and Weisbuch, 2011).

based in appraisal theory, which aims to address the limitations of both types of solution as they relate to emotion recognition: emotion appreciation. In order to focus on emotion recognition I will not describe in detail all the complexities of the theories here. However, a brief summary of the major themes will be necessary to explain how emotion recognition is understood within each theory.

1.1.1 The orthodox position on emotion recognition

Ekman's view of emotion is not the only basic emotion theory, but it is undoubtedly the one that has historically attracted most attention, and its influence today should not be underestimated. But before presenting the theory, it is worthwhile noting that Ekman's own conception of emotion has evolved, including the number of basic emotions, and, perhaps as a consequence of how pervasive the theory has become, his theory is often misunderstood or misrepresented (although it could also be argued that he has not always been entirely clear). For example, while the photographic stimuli with which he is so closely associated (Ekman & Friesen, 1976) are still often used to ascertain how well people recognise emotions (Feingold, et al., 2016; Kong, 2016; Lawrence, Campbell & Skuse, 2015), Ekman himself has criticised their use for anything other than testing the cross-cultural validity of expression recognition, describing them as "highly unusual, perhaps occurring only when someone looks at faces in a magazine in which the text is in a language one does not understand" (Ekman & O'Sullivan, 1988, p.87). Indeed, in the same article he goes on to say that, in studies designed to determine "how accurately expressions signal internal state … [Friesen and I] have used videotaped, dynamic presentations of faces judged in the context of voice and body, as well as outside of that context, with observers informed and not informed about the entire social context", rather than use the static head-shots (Ekman and O'Sullivan, 1988, p.87). A further misconception may be that Ekman is not interested in the inter-relational nature of emotion. In 1992 for example, Ekman wrote, "I believe the primary function of emotion is to mobilise the organism to deal

quickly with important inter-personal encounters" (Ekman, 1992, p.171). Thus, while a full appreciation of Ekman's theory and how it has evolved could itself be the subject of future research, I will focus on how the theory appears in its most recent incarnation and its treatment of emotion recognition, in a bid to avoid any possible confusions and inconsistencies from the past.

As far as Ekman is concerned, either an emotion is basic, or it is not an emotion at all, but possibly a mood or feeling (Ekman & Cordaro, 2011). To be described as a basic emotion, a phenomenon must fulfil nearly all of thirteen criteria including, for example, the fact that it must have a distinctive universal signal, a distinctive physiology, that it be present in other primates, that it can be of brief duration, that it elicits distinctive thoughts, memories and images and that it can have a distinctive subjective experience (Ekman & Cordaro, 2011, p.365).

There are two pillars of basic emotion theories in general, including Ekman's theory, which will be discussed throughout the introduction to this thesis: universality and coherence and addressed once more in the conclusion. While there is reason to believe the idea of universality is generally considered to relate to how accurately people can recognise the emotions in their daily lives (as evidenced by their use in emotion recognition paradigms), it seems that Ekman's argument is more subtle than that: He allows for the fact that when, for example, anger is displayed facially, it does not necessarily signify that the person is angry, and that a person can be angry without expressing it facially (Ekman, 1979). But what, then, is left of the theory of universality? It is surely less useful that these expressions can be universally recognised as being an expression of an emotion if there can be false positives (the emotion is not present but it appears so) and false negatives (it looks like the emotion is present but it isn't). In a 1994 article, Ekman famously replies to criticism of his theory made by James Russell that same year (Russell, 1994), by explaining that universality means there is agreement across

cultural and language groups that is better than can be expected by chance (Ekman, 1994)[4]. However, in 2007, Russell and Naab demonstrated that, in certain circumstances, it is possible to have participants recognize emotions 'correctly' at greater than chance levels, even though another emotion label is chosen more often than the 'correct' one (Naab and Russell, 2007). Elsewhere, he states that researchers "must continue to investigate the circumstances which govern when the face is accurate and when it is misleading as a source of information" (Ekman & O'Sullivan, 1988, p.87). Thus Ekman's concept of universality is perhaps more flexible and, by his own admission, less powerful in terms of its explanatory power, than is often recognised.

I would argue that perhaps the heart of the misunderstandings concerning Ekman's work is the fact that while the universality component of Ekman's theory relates to the recognition of emotional expression, 'universality' does not concern how the emotions are produced (or even expressed)[5]. If we take the aforementioned example of embarrassment and its exclusion from the list of basic emotions on the grounds that blushing cannot be recognised on people with dark skin, Ekman is talking about the universality of recognition and not the expression of emotions.

Even if the term *universality* has been misunderstood, it seems that there is less confusion about the second pillar of his theory of emotion: coherence. Coherence is the name given to the idea that each emotion has the same expression, physiological reaction and feeling elicited each time the emotion is incurred (within degrees of intensity) and has been put forward as a cornerstone of emotion theory by basic emotion theorists and appraisal theorists alike (Ekman, 1972; 1992; Lazarus, 1991; Scherer, 1984a; Tomkins, 1962a). In fact, Ekman also describes a particular action associated with each emotion: "Each basic emotion prompts us in a direction

[4] At one point Ekman says that he thinks that, while Russell's criticisms are too long to be read by anyone, he is worried that people will think there is some basis to them simply because they are so long. He states, "Although no one [sic] of the purported "flaws he raised is very convincing, I fear that the reader might be numbed by the number of pages devoted to this enterprise and conclude that there must be some serious problem with [my] research. I show that few of Russell's points have any merit whatsoever. Even a whole school of red herrings is still composed of red herrings," (Ekman, 1994, p.273).

[5] In one of many examples, he writes of "universals in expression" when it would be more precise to talk in terms of universally recognised expressions (Ekman, 1992).

that, in the course of our evolution, has done better than other solutions in recurring circumstances that are relevant to our goals", (Ekman & Cordaro, 2011, p.364). This suggests that, for Ekman at least, 'action' should also be included when coherence is considered.

In short, Ekman describes coherent responses, known as 'affect programs', which are triggered by events in the environment. Although partially inherited, these affect programs can still include information about how to adapt to certain recurring situations throughout the lifespan (Ekman and Cordaro, 2011). When they have become learned, these programs operate automatically, and cannot be interrupted once in process, although they may last less than a second. The importance of response coherence should not be understated, for were it to be reliably detected, it would provide strong evidence that emotions actually exist and are not simply artefacts of language – i.e. that they are not simply social constructs (Averill, 1980; Barrett, 2006a; Russell, 1994).

As proof of coherence, Ekman and colleagues described a "directed facial action task" that they said provided evidence that it was possible for emotion-specific activity in the autonomic nervous system to be produced in participants by simply asking them to move their face muscles one by one into the prototypical facial expression (without the participants realising that they were now "expressing" a particular emotion). Furthermore, they showed that the effects on the autonomic nervous system were stronger using the direct facial action task than in a second condition when participants were prompted to try and relive emotion-typical experiences (Ekman, Levenson & Friesen, 1983). This means that the simple fact of holding the facial muscles in the specific prototypical expression of emotion would provoke the related physiological changes and feelings associated with that emotion, even when the participants were unaware that their face posed that particular expression. If this result could be replicated, it would indeed be very powerful evidence of coherence, as it would mean that the physiological reactions happened even when the participants were not aware that they were expressing a particular emotion. However, in the only experimental replication I can find, Boiten (1996)

claimed to have disproved their findings. This led Ekman to dispute Boiten's conclusion in turn (Levenson & Ekman, 2002), although he nonetheless acknowledged that, "the matter is far from completely settled" (Ekman, 1999; see also Levenson & Ekman, 2002). In fact, studies on coherence are surprisingly rare, and have had mixed results, with some showing weak associations between the emotion components (Mauss, Wilhelm & Gross, 2004; Reisenzein, 2000) while others showed no associations at all (Jakobs, Manstead & Fischer, 2001; Mauss, Wilhelm & Gross, 2004).

More recently, Iris Mauss and colleagues have carried out two experiments to test response coherence (Evers, Hopp, Gross, Fischer, Manstead and Mauss, 2014; Mauss, Levenson, McCarter, Wilhelm & Gross, 2005). In the first, as the participants watched a film clip, the researchers found links between the reported experience, behaviour and physiological reaction with both a positive and negative emotion (Mauss et al., 2005). However, while the results are very encouraging, the experiment only used two emotions – one positive (amusement) and one negative (sadness) and thus any coherence that they uncovered could be related to positive versus negative emotions, rather than to proof of coherency in particular discrete emotions (Barrett, 2006b). The second experiment suggests that the *type* of emotion response needs to be considered (Evers et al., 2014). The researchers describe the difference between automatic responses (unconscious, fast and efficient) and reflective processes (relatively conscious, deliberate and effortful), which are both thought to "play in concert to promote adaptive behaviour, including emotions" (Evers et al., 2014, p.44). In an ingenious experiment (based on Stemmler & colleagues, e.g., 2001) designed to test for coherence in anger across the automatic responses (anger accessibility by means of a lexical decision task and physiological responses) and reflective responses (self-reported experience and instrumental behaviour), participants were asked to carry out tedious tasks that the experimenter kept telling them they were getting wrong, in an increasingly unfriendly manner. Participants were then given the chance to evaluate the experimenter anonymously. The evaluations were in fact used to assess

the participants 'instrumental behaviour' of anger. The researchers found coherence when either automatic or reflexive emotional responses were taken into account, but not across the response-type.

Thus while there may be renewed hope of finding evidence of coherence in emotional responses (see also Fischer & Roseman, 2007; Sze, Gyurak, Yuan & Levenson, 2010), the evidence for the claim, a cornerstone of Ekman's theory, is mixed (as recognised by Reisenzein, 2000; Mauss et al., 2005). This is particularly surprising given its importance to his theory and the possibility of using new techniques and progressively better equipment under experimental conditions, over the last 30 years (see Barrett, 2006a).

While the term "universality" has led to confusion and the concept of coherence has yet to be proven, Ekman's theory has still proved extremely important for affective science and the cross-cultural results have had a huge impact. As far as emotion recognition is concerned, the focus of Ekman's work has undoubtedly been on facial expression recognition. Indeed, Ekman and Friesen developed the Facial Action Coding System (FACS) in order to facilitate researchers in their explanation of facial movement to categorize the physical expression of emotions (Ekman & Friesen, 1978; Ekman, Friesen & Hager, 2002). Furthermore, as evidence of his focus, Ekman described 60 different anger expressions that are each different from the other basic emotions but which share common characteristics with each other, (Ekman, 1975; 1978).

It is a key point of this thesis that the focus on the facial expression of emotion can be misleading, as it may give the impression that the key phenomenon in emotion is what is happening in the face, rather than the fact that what is happening in the face is likely to be just one part of an expression of an emotion, and that there are several ways in which the emotion can be expressed. This is not to deny that the face can be a very good place to start looking when trying to ascertain how someone feels, or how he or she is likely to act next. But, I will argue, it is better to appreciate the facial expression in terms of the person's relation with an object, within a context. The importance of context is crucial to this thesis and the discussions

in later sections will provide evidence of this. Before that, I will turn to the appraisal theories of emotion and in particular to how componential theories of emotion have recently challenged the orthodox treatment of the facial expression of emotion.

1.1.2 The appraisal theory response

One of the main criticisms aimed at basic emotion theories in general is that they do not adequately take context into account. For example, they don't explain sufficiently well how two people can have different reactions to the same object, or how one person can have two different reactions to the same object: How can Francesca find a joke funny but not Joe? Or, how can Francesca have found the same joke funny earlier but not now? Appraisal theories, it is argued, deal with this better.

The basic premise of appraisal theories is that emotions are adaptive responses to our environment that promote the well-being of the organism (Moors, Ellsworth, Scherer & Frijda, 2013). In other terms, it "is not events per se that determine emotional responses, but evaluations and interpretations of events" (Roseman, 1991, p 162). Indeed, the word *appraisal* simply means the value given to the object or its emotional meaning (Clore & Ortony, 2000). Furthermore, while some theorists focus on the relation between person and object (Campos et al., 1994; Lazarus, 1991) and others on the reactions that objects elicit (e.g. Scherer, 1984b), all appraisal theorists agree that emotions are directed at objects - that they are *intentional* to use the philosophical expression (e.g. Brentano, 1995 [1874]; Searle, 1983). Other affective states that do not have an object, that are not *about something*, include feelings (e.g. tip-of-the-tongue) or moods (e.g. anxiety), (Clore & Ortony, 2000). To continue with the opening example, it is not whether the joke was a good one or not, but rather how it was evaluated, given the circumstances. It could be that Joseph was the target of the joke, and perhaps Francesca just didn't think it was funny having already heard it. Perhaps then, the main strength of appraisal

theories is that they can explain how the same object can provoke different emotions, whilst the same emotion can be provoked by a variety of objects (Roseman, 1991).

The 'well-being' of the organism is defined in different terms depending on the particular theory, but, for example, can include the terms 'concerns' (Frijda, 1986) and/or 'goals' (Lazarus, 1991). This is a key concept of appraisal theory. Whether as part of basic emotion theory or appraisal theory, emotions are reactions to what philosophers might call 'formal objects' (Teroni, 2007) but which psychologists might better recognise as 'universal human predicaments'[6] (Ekman & Cordaro, 2011), 'core relational themes' (Lazarus, 1991) or recurrent adaptive situations, (Tooby & Cosmides, 1990a; b), such as loss (eliciting sadness), threat (fear) and public failure (shame). Whereas Ekman's work has focused on the facial expression of emotion, other basic emotion theorists are more flexible as to the possibility of bodily expressions of emotion (e.g., Tracy & Matsumoto, 2008). For such basic emotion theorists then, loss leads to sadness which provokes a 'sad' facial and bodily expression, threat leads to fear and therefore fearful facial and bodily expressions and so on. However, for appraisal theorists, the goal in a time of loss may be to get the help of others, eliciting expressions of sadness such as remaining rooted to the spot, helpless; the goal in the time of threat might be to extinguish the threat, eliciting expressions of fear (drawing oneself up to appear bigger to ward off the potential attacker) and the goal in the time of shame might be to remove oneself from public view, eliciting the response of making oneself smaller (head down, shoulders dropped, before 'disappearing' from the scene altogether). Again then, for appraisal theorists, it is not the stimulus itself that causes the reaction, but the evaluation of the stimulus. For example, perhaps it is better to run than to fight, depending on how big the threatening person is in comparison to oneself or, perhaps the self-attribution of shame can be mediated by the nature of the onlooker, who had done the same thing in the past and is therefore likely to be a less harsh

[6] This expression is often misattributed to Johnson-Laird and Oatley (1992), but I have not been able to find it there (See for example D'arms, J., & Jacobson, D. (2006) or Consedine, N. S., & Magai, C. (2003)). Presumably, Ekman used a common phrase, unaware that it has (probably) been used before. In any case, the term itself has Christian and Hindu associations and its meaning is rather vague.

judge. The emotion-eliciting question for appraisal theorists is whether the object is relevant to their goals or not, while for basic emotion theorists, the reaction to particular objects is more automatic (Frijda, 1986).

Many of the appraisal theories are 'componential', meaning that they are concerned with subsystems rather than treating the emotion as a whole, as in functional appraisal theories (of which more later). For example, an emotional episode may elicit changes in physiology, feeling and behaviour (Clore & Ortony, 2000; Frijda, 2007; Roseman, 1991; Scherer, 2001). Furthermore, in addition to the appraisals that are engaged in an emotional episode to evaluate whether a particular object is 'goal-congruent' or 'goal-incongruent' (which evaluate how relevant an object may be for the well-being of the individual), other appraisals are employed depending on the circumstances. In a certain sense then, the emotions are the result of certain satisfaction conditions of the goals (Frijda, 1986).

One of the main differences between basic emotion theory and a componential appraisal theory is that, whereas basic emotion theory describes a finite number of emotions which explain the range of emotional experiences, a componential theory describes a great number of emotions, each composed of a finite number of components (Johnson-Laird & Oatley, 1992). The exact number and name of appraisals depends on the particular componential theory, although most include appraisals of certainty, agency and coping potential (Moors et al., 2013). For example, a boss sees one of her employees as the cause (agency) of the failing project (goal congruence) and she does not know (certainty) whether she can save it (coping potential). When reacting to a certain object in the environment, it is as if the individual must answer a certain number of fundamental questions so as they know how to act and to know how they feel (Scherer, 2009; Smith & Ellsworth, 1985). In the previous example, the questions would be, "Is it my fault?" (i.e. that the project if failing); "Is this object goal congruent"? (i.e. Do I want the project to fail?); "How sure can I be?" ; "How will I cope?" (i.e. Can I save the project to realign with my goal of making it a success?).

This distinction can be shown particularly clearly in the recent interest that certain componential theorists have shown in emotional facial expressions, as they have taken up the challenge posed by Ekman concerning facial expressions of emotion. These researchers associate the FACS (Ekman & Fiesen, 1976), not with emotions themselves, but rather with the appraisals (de Melo, Carnevale, Read & Gratch, 2014) and appraisal components (Mortillaro, Meuleman & Scherer, 2012; Scherer, Mortillaro & Mehu, 2013). For example, according to this view, raising your chin (AU17; Ekman & Fiesen, 1976), is no longer simply one of the signs that you are angry but rather, it is indicative of the appraisal of 'coping potential' (Scherer, Mortillaro and Mehu, 2013) and we do not smile because we are happy, but rather because the outcome goal is appraised as conducive (de Melo et al., 2013; Scherer and Grandjean, 2008).

In 2008, Scherer and Grandjean replicated and extended a study carried out by Yik and Russell (1999) in which participants were shown static pictures taken from Ekman and Friesen's Pictures of Facial Affect database (1976) and, depending on the condition, were either asked to complete a standard forced-choice recognition questionnaire to name the emotion or to state which of the 'message judgements' was represented by the facial expression (Fridlund, 1994). Scherer and Grandjean extended the original study by adding two conditions in which either the participants were asked to state which action tendencies were suggested by the facial expression (condition 3), or to name the appraisals that were involved (condition 4). As the authors expected, the participants recognised the expressions most readily and most confidently in terms of the emotion words themselves (happiness, sadness etc.), followed by the appraisal terms and then, by the message judgements and action tendencies. The authors explained these results by arguing that appraisals were to a large extent automatic and unconscious and, as a consequence, basic emotion theorists and componential theorists alike would predict "that judges' primary response to affective facial expression consists of identifying an underlying emotional quality, often specified by emotion labels" Scherer and Grandjean (2008, p.799).

There appear to be a number of issues with this experiment that I will use to advance discussions that will be treated in more depth in the following sections. Firstly, and similarly to Ekman's focus on facial emotion recognition, there is an underlying implication that the context of the facial expression doesn't matter, although this is surely not the authors' intention given their research on much wider contextual issues in emotion (such as the voice – Banse & Scherer, 1996; or body action and posture – Dael, Mortillaro & Scherer, 2012a). Nonetheless, there is an enormous amount of research that underlines the importance of context when trying to recognise how someone is feeling and likely to act next. Secondly, and by the author's own admission, this paradigm is a naming exercise. It is hardly surprising that the participants can name expressions because they are being asked to name them. In other words, why, if the authors argue that appraisals were not as accurately identified due to their 'quasi-automatic and unconscious nature' can the same not be true of their action tendencies and their 'social messages' (Fridlund, 1994)? The authors admit that, "from the representation of the total emotion category, we can also infer the parts, that is, the appraisals, the action tendency, and the potential messages and appeals" (Scherer & Grandjean, 2008, p.799). While it makes sense that it is possible to infer all of these things from recognition of the emotion category, it seems to be perfectly possible that the emotion category can also be inferred from its components. Thirdly, in real life, when we are talking to someone, do we consciously name the emotions that we think they are experiencing or rather, as seems more likely, do we adapt and align the emotional message we are trying to communicate to our partner's signals, as a function of their expression (Parkinson, Simons & Niven, 2016)? Finally, and more generally, for this discussion to have any real bearing on the world, it needs to be assumed that individuals often express emotions in ways that are similar to the Ekman and Friesen (1976) database. There is reason to doubt this, as will be pointed out in the next section.

1.1.3 Evaluating the identification of emotion through facial expression

More than 60 years have passed since an influential scientific review of experimental work carried out on emotion recognition concluded that, "all in all, one wonders about the significance of studies of the recognition of 'facial expressions of emotion', in isolation of context" (Bruner & Tagiuri, 1954, p.638, cited in Hassin, Aviezer & Bentin, 2013). Indeed, one wonders if it was not important for the concept of 'universality' of facial expression to underplay the importance of context: If it could be shown that the expressions that are produced and/or recognised are culturally or contextually specific, this would be anathema for the concept of universality, or a threat, at the very least. On the other hand, if it could be shown that a certain number of facial emotional expressions are produced and/or recognised cross-culturally in spite of context or cultural differences, the argument would be even stronger.

Perhaps the most obvious criticism of Ekman's research is its association with bodiless static pictures posed by actors portraying an expression (Russell, 1994). It appears that for a great deal of the emotion recognition studies that have been published, student participants have had to recognise the portrayal of an emotion played by actors (as instructed by the experimenter, given their interest in the emotion being recognised), the validity of which had been tested on piloting using other students, and which represent the particular emotion in a static face condition that is not particularly representative of real life. This approach has clear limitations as far as ecological validity is concerned (Barrett, Mesquita & Gendron, 2011; Russell, 1994). For example, it is not clear how often we are presented with moments of statically expressed emotion in our daily lives. Even if allowances are made to include brief, relatively unchanging facial expressions, we are not continually presented with emotions that are expressed as intensely as the stimuli associated with Ekman. Success rates are not encouraging when participants are asked to code spontaneous emotional facial expressions of people watching films (Wagner, MacDonald & Manstead, 1986), or in real life social contexts**,** in negative situations (Scherer and Ceschi, 2000)**,** or positive situations (Fernandez-Dols &

Ruiz-Belda, 1997). In one experiment, for example, airline passengers were filmed at the lost-luggage desk in an effort to judge how well their reported felt emotion correlated with the emotion recognised from their faces**,** by student judges and the employees working at the lost-luggage desk (Scherer & Ceschi, 2000). Using the FACS (Ekman & Friesen, 1978), the authors found that even though the passengers reported feelings of anger/irritation, resignation/sadness, worry/stress, good humour and indifference, they barely made any facial expressions other than smiling. Furthermore, they identified two groups of passengers whose facial expression clouded their results: those who did not smile at all but reported high levels of good humour and those who smiled a lot but who reported very low levels of good humour.

A further criticism relates to the fact that it is simply not the case that there is a one-to-one correlation between facial expression and emotion. It is possible, for example to have a rueful smile, a smile filled with contempt, a smile of recognition, an embarrassed smile and many others: the same expression can *mean* different things. Recent research has shown that the same muscles in the face are used during expressions of *schadenfreude* and joy, although feelings of pleasure were reported as being higher in the joy condition (Boeker, Likowski, Pauli & Weyers, 2015). The fact that the same expression can be the manifestation of several different emotions has been called *equifinality* and can be described as the final end-state being caused in many different ways – here, in the examples above, the smiling face is caused by experiences of ruefulness, contempt, an old friend, embarrassment etc. (Campos, Dahl & He, 2010). Conversely, the same emotion may be expressed in several context-dependent ways**,** behaviourally. For example, if someone is scared, they may choose to fight or to escape, or may even be so scared that they cannot move. This dissociation of emotion from behavioural reaction is called *equipotentiality* (Campos, Dahl & He, 2010; Campos, Frankel & Camras, 2004).

Furthermore, it is possible that the same stimulus may cause different context-dependent (facial) reactions – a risqué joke may make an individual smile when in the company of friends, but be disgusted or surprised when in church. Indeed, we may temper our expressions

depending on the circumstances (Evers, Fischer, Rodriguez Mosquera & Manstead, 2005) – Ike may look surprised rather than happy when he receives the promotion at work for which he was in competition with colleagues, or angry**,** rather than scared**,** to ward off potential threats.

From a third-person point of view, it is not always clear from the face which emotion is being expressed, particularly if the expression is static (Aviezer, Trope & Todorov, 2012; Fernandez-Dols & Caroll, 1997; Mortillaro, Mehu & Scherer, 2011). For example, in one experiment a particular expression from the Ekman and Friesen (1976) database was recognized by 70% of participants as expressing 'fear' when it was set in the context of a gun pointing at the expressor, but was recognised by 74% of participants as expressing 'sadness' when it was presented in isolation (Aviezer, Hassin, Bentin & Trope, 2008). Furthermore, using an eye-tracking paradigm, when angry or disgusted faces were placed on angry or disgusted bodies, analysis revealed that the participants looked at the eyes in the angry body condition (where expressions of anger are usually processed – see Calder, Young, Keane & Dean, 2000) and at the mouth in the disgusted body condition (where expressions of disgust are usually processed). The authors concluded that the inclusion of the body provided an unavoidable context for the facial expression (Aviezer et al., 2008).

Two studies carried out by de Gelder and colleagues indicate that when participants are presented with incongruent face-body expressions (i.e. that the face expresses a different emotion to the body), the responses become biased to the bodily expression (Meeren, van Heijnsbergen & de Gelder, 2005; Van den Stock, Righart & de Gelder, 2007). In other words, participants automatically integrate the contextual information provided by the body when processing the facial expression, even when exposure to the picture is as brief as 150ms and irrespective of cognitive load. In the same vein, she carried out an experiment where facial expression is more accurately identified when it is embedded in a congruent scene (Righart & de Gelder, 2008), indicating that this integration is done on a mandatory, quasi-automatic, perceptual basis.

But the most simple of experiments can demonstrate the power of context more powerfully. One study in particular demonstrated this by showing that when a (fearful or angry) facial expression is held constant, participants rated expressions as being more angry when the gaze of the expresser was directed at them, but more fearful when the gaze was averted (Sander, Grandjean, Kaiser, Wehrle & Scherer, 2007). The conclusion is that an angry expression, which is directed at the participant, or a fearful one directed to the side or behind the participant, is more person-relevant and more likely to be recognised as a consequence. Thus, the simple manipulation of a third party's eye gaze can provide a context and meaning that is otherwise lost, when simply taking the facial expression into account.

Of course, non-behaviour can also be highly expressive (Frijda & Tcherkassof, 1997). There need be no expression at all, for an emotion to be inferred. For example, when accused of some crime or misdemeanour, no reaction at all may be taken as an admission of guilt and guilty feelings, although these do not necessarily exist.

In sum, we can infer from faces how the person is feeling and what caused that feeling (and that expression). We can even give that facial expression a name - the expression of happiness, the expression of fear, for example. We can even distinguish between those expressions. But yet, the emotion does not reside in the face - the facial expression is a physical manifestation that reflects the relationship that the person has with an object in the environment. While we may be wrong or right about naming an expression, we are much more likely to be able to infer the feeling, its antecedents and its consequences, if we take into account as much as we can about the relationship the person has with the objects in their environment. In fact, recent research suggests that information about the body posture is automatically integrated when we are determining expression labels, even when instructed not to (Aviezer, Bentin, Dudarev & Hassin, 2011). By focusing on facial emotion recognition, the risk is that the research focus simply centres on how accurately we can distinguish between facial expressions. But if the goal is to be able to understand how others are feeling and how they might act, it is

surely better to put the face in the context of the body and/or the voice, the goal, the object and environment that caused it. In mechanical terms, there is simply more data upon which to base the inferences.

Of course, this idea is hardly new and has been expressed most clearly in my opinion by an analogy using language: While it is certainly useful to teach someone that there is a physical difference between the words *boat* and *coat*, it is undoubtedly more useful to teach them what *boat* and *coat* mean (Walle & Campos, 2012). Being able to accurately recognise the differences between facial expression and being able to put a name to them is surely limited, whether it concerns the expression itself or the components of that expression. Similarly, to appreciate how Samuel is feeling, it is not enough to recognise, say *fear*, but rather, one has to know of what Samuel is afraid (Goldie, 1999).

These simple arguments concerning the frequency with which prototypical facial expressions are made, equifinality, equipotentiality and context seem to be fatal for the idea that there is a one-to-one relationship between internal state and facial expression. While it may not be the case that Ekman argues for such a hard association between stimulus and expression, these arguments suggest not only that appraisal theories can better explain weaker associations, but also that the face is not entirely reliable to judge emotion. Although componential appraisal theories have made the link between the elicitation of an emotion and its facial expression more explicit than is the case in basic emotion theories (Scherer, Mortillaro & Mehu, 2013), the renewed interest in explaining facial expression in terms of appraisal seems limited by the some of the same constraints as basic emotion theory: just as a smiling face can signify that we are happy, that we are compliant, or that we are proud (for example), a pulled down brow might mean that we are angry, that we are concentrating or even, that there is too much light in the room. Furthermore, while it seems plausible, for example, that AU10 (upper lip raiser) is activated as the result of the appraisal that a 'violation of norm compatibility' has taken place and that this signals anger (Scherer, Mortillaro & Mehu, 2013), it seems unlikely that the same

fine componential analysis could be extended to bodily movements in spite of the fact that a system for post-hoc analyses of such movements exists (Dael, Mortillaro & Scherer, 2012b), and even if there is some evidence that observers look at specific parts of the body when asked to identify the emotion of others (Fridin, Barliya, Schechtman, de Gelder & Flash, 2009). For example, during anger and fear, observers devote most attention to the hands and arms. Of course, there are certain emblematic postures and body movements that signal affect or emotion culturally – crossing the fingers to signal hope in the UK and the US is 'translated' in Germany by pressing the thumbs against the palm of one's hand, for example – but these are not really what is meant, just as tongue protrusion can be a signal of disgust, anger or simple playfulness, depending on the context.

Facial expressions of emotion have been shown to be less reliable as a source of information about how the other feels or is likely to act than has traditionally been argued. Evidence has been provided that indicates that prototypical facial expressions are seldom seen and when they are, they are often better appreciated when in context. To rely too heavily on facial emotion, is to be prone to misinterpretation and inappropriate response, (Ambady & Weisbuch, 2011). As stated elsewhere, "Context does not merely change emotion perception at the edges; it leads to radical categorical changes," (Hassin, Aviezer & Bentin, 2013, p.60), and it appears to do so automatically. Attention now turns, more explicitly, to the social context. I will argue that the social context puts certain constraints on the production and expression of emotion that can be observed by a third party.

1.1.4 Putting emotional production and expression into social context

This thesis opens with the story of how Silvan Tomkins convinced Paul Ekman and Carroll Izard in the mid to late 1960's to search for evidence of universals in facial emotion recognition. According to Ekman, Tomkins was only one of a few psychologists at the time who thought that such a phenomenon could exist (Ekman, 1993). Perhaps for reasons touched upon

earlier, it seems necessary for any account of universality in facial expression or facial recognition to deemphasize, or even deny, the relevance of context. While the important impact that basic emotion theory has had in affective science is undeniable, there have been many empirical and theoretical attempts to support the idea that context is indeed influential in how we recognise how others feel towards the objects in their environment, as the evidence cited in these first sections attests. However, as long as basic emotion theory can reasonably be described as 'the orthodoxy', it means that more research is needed to reassert the position of context as a vital factor in emotion recognition. And while the context of dynamic aspects of emotion expression and the bodily expression of emotion has received perhaps most attention (see the previous section), it seems that the 'social context' has been the most neglected.

In a recent review of appraisal theory written by some of its most notable adherents (Moors, Ellsworth, Scherer & Frijda, 2013), the word 'social' was not used until the last paragraph, and only then in terms of 'future research', the term 'relation' was only used concerning relations between mechanisms of appraisal**,** while the word 'context' was only used twice, once in terms of the 'context' in which the word *appraisal* was now used and once for describing 'events in their context' (Moors et al., 2013). While this does not mean that appraisal theories have nothing to teach us about the social context in which persons relate to objects, nor that its many adherents do not consider such issues, it does suggest that there is still more to do in terms of convincing researchers of the importance of social context, and perhaps a change in focus (Parkinson, 2011a).

In 2001, Manstead and Fischer explicitly proposed such a change in focus, and while Fischer tried again in 2010 (in an article entitled, "Where have all the people gone?", Fischer & Van Kleef, 2010), Manstead tried again in 2015 (Parkinson & Manstead, 2015). The authors encouraged emotion researchers to consider, not only what we can infer about a person in terms of their personality from their emotional expression (e.g., Hareli & Hess, 2010; Hess, Blairy & Kleck, 2000; Knutson, 1996), but also what their expression can tell us about their social

environment. In fact, perhaps encouraged by these efforts, the have seen renewed and growing interest in the social mechanisms that constrain emotion expression production and recognition, going beyond the mature debate about whether we regulate our automatic expressions for onlookers (Ekman, 1972) or whether the expression output is automatically produced for the benefit of onlookers (Fridlund, 1994: see Parkinson, 2005 for discussion).

Ambady and colleagues have carried out a number of experiments that demonstrate an ingroup-outgroup effect for recognition and effects of emotion. For example, ingroup perceivers are positively affected by positive expression of ingroup members and by negative expression of outgroup members. Similarly, ingroup perceivers are automatically negatively affected by negative expressions of ingroup members and by positive expression of outgroup members (Weisbuch & Ambady, 2008). Furthermore, ingroup members were better at identifying emotions in ingroup members than outgroup members (Elfenbein & Ambady, 2002). This effect has even been demonstrated in groups as disparate as cat-lovers and basketball players (Thibault, Bourgeois & Hess, 2006). While accepting the argument that these results could be explained by an evolutionary important ingroup advantage, Ambady and colleagues prefer to explain their findings by appealing to the concept of 'non-verbal accents' (Ambady & Weisbuch, 2011). By way of defining the term, they present further findings in which they compare the emotion recognition scores of US and Chinese participants in terms of their exposure to the US and Chinese cultures: experimental groups are made up of Chinese in China, recent Chinese immigrants to the US, second generation Chinese immigrants born in the US and non-Chinese, US citizens. As expected the more the group was exposed to either culture, the faster and more accurate were their responses (Elfenbein & Ambady, 2003a). The idea then, is that there are subtle regional differences in how emotions are expressed and that these are better recognised by 'locals'. Indeed, another study showed that the results were systematically better the closer the perceiver group was based to the expresser group (Elfenbein & Ambady, 2003b) The authors argue that in light of these results and through the concept of 'non-verbal accents', they

have found a mid-way point between arguments of 'universality' and a hard 'culture-is-all' view: they state that there are a number of emotions that are recognised cross-culturally, but which have regional variations in their expression and their recognition (Ambady & Weisbuch, 2011).

It could be informative to measure whether the ability to recognise someone's emotions depends on their stated identity; in other words, to evaluate whether the mere fact that someone is described as being a member of the 'ingroup' or 'outgroup', affects the ability with which their emotions are recognised. For example, participants could be assigned to one of two conditions in which they are asked to perform a simple emotion recognition task, of pictures or short videos, of people who are described in condition 1 as "local people" and in condition 2 as "foreigners". If it could be shown that the representation of the people's identities could be manipulated in such a straightforward way, according to the phenomenon of group bias, the emotional expressions should be more easily recognised in the 'local people' than in the 'foreigner' group[7]. This would challenge somewhat the 'dialect theory' of emotion processes (Elfenbein & Ambady, 2003c) that posits that the positive in-group bias can be partly explained on the grounds that emotions are *expressed* differently in each culture (Elfenbein & Ambady, 2003a) since, in this experiment, the expressions and the expressers would be the same in each group. Although presented as a cross-cultural emotion recognition test, the experiment would actually be a measure of how the stated cultural identities of others affect emotion recognition, even when the people and their expressions are held constant.

In a similar vein, but at a more interpersonal level, recent research has shown that the nature of the social situation can have a bearing on how behaviour is regulated. In one experiment, participants were asked to play a typical prisoner's dilemma game where they could win more money through cooperation than by playing competitively and risking punishment

[7] A local real-life example of a group of people undergoing a change in identity and attitudes is that of the political asylum seekers who left the civil war in Yugoslavia and who were welcomed to Switzerland. It seems that there has been a negative change in attitudes towards the asylum seekers when their identity evolved from 'asylum seeker' to become 'Albanian and Kosovan refugees', since when, they are perhaps thought of in even worse terms, now that they are identified as 'Muslims'. (Provided by Tania Zittoun during a recent conference at the University of Neuchâtel.)

(de Melo et al., 2013). The participants cooperated more when the virtual agent looked happy, in the event of a mutually beneficial decision being taken, or when the virtual agent looked sad or regretful having exploited the participant. Conversely, the participant cooperated less, when the virtual agent looked sad or regretful at a mutually beneficial decision, or when the virtual agent looked happy when exploiting the participant. In other words, the participants took the cooperative-competitive context into account when trying to give meaning to the facial emotion expressions. In an interesting twist, Van Doorn, Heerdink & Van Kleef (2012) present results that suggest that people can use emotional expression to infer whether the situation is cooperative or competitive and that the compulsion to make this inference can override explicit written information to the contrary.

Recent work on how emotions affect the give and take in negotiation has revealed not only that when confronted with an angry opponent individuals develop a negative impression of the opponent, becoming angry themselves (Van Kleef, De Dreu & Manstead, 2004a), but also that they may be less willing to interact with them as a result (Van Kleef, De Dreu & Manstead, 2004b). Furthermore, it appears that how someone reacts to an angry opponent is mediated by power, in terms of the number of negotiating options available to the participant, and appropriateness[8]: low powered negotiators' strategies are unaffected by the appropriateness of the higher-powered negotiator, while the higher powered negotiator is likely to drive a harder bargain if she feels that the other has shown inappropriate anger (Van Kleef & Côté, 2007).

It appears that the context in which the expression is observed can modulate how the expression is identified, whether context is manipulated in terms of the objects on the environment (a gun pointed at a 'sad' face, Aviezer et al., 2008) or in terms of the relation between two people (cooperation v competitive, de Melo et al., 2013), and that these contextual features may be taken into account quasi-automatically (de Gelder & Van den Stock, 2012).

[8] Shields (2005) defines an appropriate expression in terms of its suitability for the situation and its proportionality to the circumstances – is it too much or too little, given the context. This definition was employed here for this experiment.

In the next section, I will set the criteria for the new approach to emotion recognition, basing it on theoretical foundations that have been proposed by others; namely that emotions are attempts "to establish, maintain, change, or terminate the relation between the person and the environment on matters of significance to the person" (Campos et al., 1994, p.285). In other words, they are the result of the goals that the individual has on the object (Lazarus, 1991) and relate to the universal human predicaments that humans, and perhaps some non-human animals, face during their lives. More importantly for the basis of the thesis, I will argue that these emotions can often be appreciated by a third-party, and are perceived as signals, not only about how the observed person feels about the objects in their environment, but also how they are likely to act upon those objects.

1.1.5 Towards a new approach: Emotion Appreciation

I said at the beginning of this introduction that this thesis was particularly concerned about 'the receiver question' - what the observer infers from the expression, rather than the 'sender question' - the processes that produce the expression (Frijda & Tcherkassof, 1997). There are, of course, many things to say about why we express anything at all – for example, are the expressions remnants of functional facial movements (e.g. a baring of teeth when angry as the result of an ancient reflex showing that we are ready to attack, even bite, the other) as Darwin suggested (1872/1998), or rather as an act of social communication (Fridlund, 1994)? But these matters do not directly concern us here: it is enough to say, as I have pointed out earlier, that observers make inferences concerning how others feel about the objects in their environment, and on that basis, that they make predictions about how the others are likely to act (see Dennett's intentional stance, 1989; Gilbert's "ordinary 'personology'", 1998).

So far in this thesis, I have argued against the orthodox method of describing emotion recognition and particularly its focus on the face. I have explained and criticised an alternative method, proposed by appraisal researchers, which was, at least implicitly, designed to meet the

challenge posed by the orthodoxy. In particular, I presented evidence that suggested that contextual information could be quasi- automatically integrated into any process of emotion identification, presumably even before an emotion is fully identified for categorisation. Research shows that, rather than seeing the face on a person and inferring how that person feels as a consequence, it is the face on the body in the context of their relation to the eliciting object that is taken into account. When trying to appreciate the person-object relation, the contextual information is not a luxury (Goldie, 1999): As stated elsewhere, "Although it seems to us that in "real life" we see faces as angry, fearful, and so forth, it is not the faces that we see, it is the face-context combinations." (Hassin, Aviezer & Bentin, 2013, p.64).

Appraisal theorists argue that emotions are the result of the goals and motivations that an individual has on the other object (e.g. Campos et al., 1994, Lazarus, 1991; Scherer, 2001). They argue that emotions are closely intertwined with what they are trying to do (Dewey, 1895). But while componential accounts tend to focus on the structure of emotions, functional accounts (e.g. Barrett and Campos, 1987; Frijda, 1986; Lazarus, 1991) focus on their relational nature and the adaptive purpose they serve (Keltner & Gross, 1999). They aim to address questions about the causes of emotions, conceptualizing emotions as solutions to specific problems of their relations to the environment on matters of significance/concern to the person. In short, for functionalists, emotion is relational and, save for a few exceptions, (affective) relations are contextual[9].

Frijda and Tcherkassof argued that emotion could be directly seen in the action of the other. Appealing to Dennett's (1978) theory of the intentional stance, they pointed out that to grasp the sense of relational activity, "merely requires that movements be viewed as behavior – that is, as purposive, as movements related to the organism's environment and as guided by aims in relation to that environment", (Frijda & Tcherkassof, 1997, p.95-96).

[9] It has been pointed out that there are a certain number of objects that universally and automatically elicit a specific affective response (Berlyne, 1960, as cited in Silvia (2005); Frijda, 1986). One example might be that fluffy cats universally elicit emotions of care and affection, presumably even if it is only a static head shot of the cat!

But context is more than action: the emotion is no more entirely reflected in the action the person takes than it is in their facial expression. I remember a television scene where the viewer saw an old woman using a cane, hobbling along. Running towards her, as fast as he could, was a young man with tattoos, a shaved head, ear and nose piercings and a strained look on his face. The camera cut back and forth in a way to heighten the viewer's anticipation of an attack. Sure enough, the young man threw himself at the elderly lady and she fell to the floor. This was the end of the human action. From the action, we could surmise that the young man's face expressed anger (or aggression, at least), that the object was the old woman (or her wallet) and that his goal was to steal her money. Indeed, this response was clearly the intention of the director. However, in a later sequence, it was revealed that a heavy piece of scaffolding landed where the elderly lady would have been, had it not been for the young man's intervention. Taking the context into account then, we, the viewers, understand that the expression on the young man's face was fear, the object was the endangered woman, and his goal was to save her from harm.

In any case, surely a theory proposing 'action readiness' as the phenomenon that is recognised, suffers from the same constraints as facial expression: frequency, equifinality, equipotentiality and context seem to be just as fatal for the idea that there is a one-to-one relationship between internal state and action as it is for facial expression. The authors admit as much when they state: "The links between emotion categories and modes of action readiness, while sometimes clear and intrinsic, thus are no way fixed or absolute" (Frijda & Tcherkassof, 1997, p.96). Indeed, the emotion is not found in the face but rather in the person-object-environment relations.

This differentiation, between an action-focused and context-focused account, seems particularly warranted when the social context is taken into consideration. While the concept of social appraisal (Manstead & Fischer, 2001) highlighted how we can use others' appraisals of an object while appraising the object ourselves, the evidence presented in the previous section

suggests that the nature of the relation between the person and the observer can have an important effect on what is understood and learned from the expression of the other.

One of the main points of this thesis is to demonstrate how observation of other people's manifestations of their relation with an object and subsequent inferences about how they feel towards the object, can inform us about how we should feel about the object ourselves and predict how the other might behave. In other words, we may learn how to feel and how the other might act. But while the relationship between the observer and the person they are observing seems to play an important role in determining what exactly is learnt, researchers have recently identified and categorized 56 models of emotion understanding (Castro, Cheng, Halberstadt & Grühn, 2016), of which 97% focused on emotion recognition of people that were completely unknown to the participant.

Certainly, a number of other authors have highlighted this relational aspect of emotions to their social environment (Frijda, 1986; Manstead & Fischer, 2001; Parkinson; 1996), and it suggests, at least, that the expression can lead observers to infer not only about the person themselves and the nature of the object, but also about the features of the environment (Van Doorn, Heerdink & van Kleef, 2012). But while the emotion appreciation account is inter-relational in the sense that the inferences drawn by the observer may rely somewhat on their relationship with the person they observe, such an approach says little about the interpersonal aspects of emotion. The EASI (Emotions as Social Information) model focuses on the interpersonal aspects of emotion, identifying two processes by which an observer's behaviour may be influenced by another's expression – inferences and affective reactions (Van Kleef, 2009; Van Kleef, De Dreu & Manstead, 2010). The model argues that inferences are more likely to be made in competitive circumstances where the competitor's emotions can be used strategically, while affective reactions (i.e., emotional contagion, affect infusion, and mood management) are more likely to be employed in cooperative circumstances where no threat is present. This social interaction model perhaps points one way for an emotion appreciation approach to be extended,

or indeed, for it to be incorporated into an existing model. But before consideration can be given to how it might be extended, it must first be explained.

Emotion appreciation then, is a novel approach that focuses on what can be understood from the affective component of others' behaviour. It is a third-person approach in the sense that it is not about how 'I' am feeling or the processes that affect 'me', nor about 'you' and how you are likely to act, but rather how 'he/she/they' is/are feeling. Again, given that it is impossible to know what another person is experiencing, it is entirely an inferential process. In other words, we can infer how the other person is feeling and how they are likely to act from their on-going relationship with the environment.

It must be kept in mind that this approach has been uncovered post-hoc, that is, I did not set out to test this approach in this thesis. However, it struck me that there was something original to what we wrote with respect to emotion recognition and I have tried to formulate it in this introduction. Tentatively then, I provide a list of nine theoretical assumptions and descriptive features of emotion appreciation here. The approach will be evaluated in the conclusion to the thesis, in part as a function of how well it answers the questions that have been motivated by this introduction.

1.1.6.1 Theoretical Assumptions and descriptive features of Emotion Appreciation

1. Emotions result from the goals that the individual has on an object - what the individual wants to do with/to the object, for example, and not from the object itself.
2. Emotions are real: they exist outside any particular language.
3. They relate to "universal human predicaments" such as 'loss of object' (sadness), 'intentional blocking of object by another' (anger), 'danger from object' (fear).
4. Emotion-words describe the relation that the individual has to the object (rather than the feeling or action tendencies).

5. Emotions can, for the most part, be inferred by third parties, in terms of how they are manifested in the relationship between the person and object via the facial expression, vocal expression, body expression and context.
6. It is possible for a third-party to infer how the individual feels about the objects, and consequently, what the person's goals are with respect to that object.
7. Given that there is no direct transmission of the emotion to the third-party, it can be assumed that the manifestation is genuine – it is not being modelled for the onlooker's benefit.
8. A distinction is made with occasions when the onlooker is being taught something directly from the person they are observing. There is a difference in the intention of the other – they are not teaching (social referencing and natural pedagogy), even if the observer is learning something (about the person's evaluation of objects or their goals).
9. Emotion appreciation can take place whether the observer is intentionally trying to learn something or not.

There is much here with which a constructionist might agree (e.g. J.A. Russell or L.F. Barrett). For example, they would agree that emotion cannot reliably be recognised on the basis of facial emotion recognition, or even the affective component of action, and many of the arguments here proposed as criticisms of relying on the facial expression of emotion have been touched upon by either Russell (e.g. 1994; 2003) or Barrett (e.g. Barrett, Mesquita & Gendron, 2011).

But there is one assumption with which they would clearly not agree, namely that emotions exist outside language. Indeed, the core argument of the constructionist approach, as the name would suggest, is that emotions are *constructed* in the mind of the perceiver (or first-person experience) rather than triggered by an object and the goal context (Barrett & Russell, 2014). They deny entirely that various instances of a particular emotion, for example fear, have

anything in common, other than what is in the mind of the perceiver. Indeed, Barrett even hypothesizes heterogeneity at the conceptual level (Barrett, 2006[b]). Rather, she argues, "that a perceiver creates an emotion out of those mere physical changes by adding information from past experiences about the psychological meaning and utility of those changes." (Barrett, 2014, p.49).

There are two criticisms to be made here. The first is that I think emotions are real, as argued earlier. Barrett describes how emotions *become* real in the sense that flowers and weeds become real by a process of categorisation based on conceptualisation (Barrett, 2012). She explains: "A plant's status as ⌜flower or weed⌝ is determined by some extent – a verbal declaration involving a word or label (e.g., "this is a flower") or a meaningful situation (e.g., a rose bush is a weed if found in a vegetable patch and a dandelion can be a flower if placed in a bouquet of wildflowers," Barrett, 2012, p. 417). She also gives the example of how a dandelion presented to you by your gardener has a different meaning than when it is presented to you by your five-year-old daughter, because it is a weed when presented by your gardener but a flower when presented by your daughter.

However, as Dub (2015) has argued, properties can exist, in this same sense, prior to their categorisation. It would be strange to say that rocks or trees only exist because we identify them as such. Perhaps the difference between being presented a dandelion by your gardener or your daughter is more to do with the intention of the other person. In other words, it is not in the process of categorisation alone (based on prior concepts) that gives the plant its 'weediness', a rock its 'rockiness' or a particular sensation the properties of a particular emotion (fear): the basis for describing something as a weed or as an emotion resides in properties that pre-exist the categorisation process. The same case could be said for rocks or trees – their 'realness' or their 'existence' does not depend on us categorising them[10].

[10] Objects for which this might not be the case include promises or countries.

This leads to the second criticism: It appears from this argument that emotions can only exist when they have been identified. However this would suggest that emotions could only affect one's behaviour when they are identified or categorised. But surely fear can make me run (or fight or stay exactly where I am) before I would identify the emotion. Furthermore, this line of argument implies that human pre-verbal infants or any animal cannot experience emotion. Indeed, Barrett explicitly states that "the conceptual knowledge about emotion that is necessary to support emotion perception is not available to young children, so that children's early emotion concepts do not support the perception of distinct categories of emotion like anger and sadness," Barrett, 2006b, p.39). Intuitively this seems highly unlikely, although there is very little evidence to suggest the contrary in terms of variety of responses to discrete emotions in non-verbal infants (Walle and Campos, 2012). While there is evidence that babies aged 4 months respond discriminately to multimodal displays of discrete emotion (e.g. Flom & Bahrick, 2007) and aged 5-7 months unimodally (Fernald, 1993; Flom & Bahrick, 2007; Kestenbaum & Nelson, 1990), there are few studies where the infants react as a function of the emotion presented to them. While developmental psychology is replete with examples of older infants regulating their behaviour as a function of displays of third-party emotion, most of the studies are designed in terms of positive vs negative valence (see chapter 5), although there is some evidence that infants aged around 18 months can discriminate between two negative emotions (Gendler-Martin, Witherington and Edwards, 2008).

Two general questions are thus raised by the introduction so far:

1. What role could emotion appreciation play in learning the value of objects from others?
2. How could emotion appreciation enable us to learn about others' mental states and their likely action?

1.2 Interest

The title of this thesis describes 'interest' as 'an informative case'. One reason for this is that research on interest can inform us about the limitations of the orthodox position. In fact, affective researchers are split as to whether interest should be classified as an emotion or not, and it seems that this disagreement can be boiled down to the fact that researchers have tried and failed to find a prototypical static or dynamic facial expression of interest that can be universally recognised or indeed, satisfactorily recognized at all (B. Campos, Shiota, Keltner, Gonzaga & Goetz, 2013; Ekman, 1993; Mortillaro, Mehu & Scherer, 2011; Reeve, 1993; Reeve and Nix, 1997). A second reason for describing interest as 'an informative case' is due to the fact that we argue elsewhere that just as sadness is associated with the value of 'loss' and fear with the value of 'danger', interest is associated with the 'informative' and with 'understanding' (Lauria, Dukes & Clément, in review)

We have suggested that emotion appreciation may help us infer how others value the objects in their environment. According to appraisal theory, the first part of this process from a first person perspective is to detect relevant objects (Scherer,1984b; Frijda, 1986). But what is the difference between finding something interesting and finding something relevant? And if we are to argue that emotion appreciation is about learning through the affective displays of others, are we to classify interest as an emotion, or as some other type of affect?

1.2.1. Is interest an emotion?

In a recent review of the basic emotion theories of Panksepp and Watt (Panksepp, 1998; Panksepp & Watt, 2011), Levenson (2011), Ekman and Cordaro (Ekman, 1992, Ekman and Cordaro 2011) and Izard (2009; 2011) one of the major differences that distinguished the theory espoused in Ekman and Cordaro (2011) from the other theories is that, while interest or some

form of it (e.g. SEEKING; Panksepp, 1998) is included in the list of basic emotions in the other theorists' accounts of emotion, no such place is given by Ekman (Tracy & Randles, 2011).

In fact, although Ekman once considered interest as a candidate for his set of basic emotions (Ekman, 1993), it never made the cut, presumably because he could not find a prototypical expression of interest that was universally recognisable. Indeed, he recently described interest as "a cognitive state of focused attention" (Ekman and Cordaro, 2011). Meanwhile, Izard argues that not only is interest an emotion, but that it is a special emotion that is "at the root of all selective attention and that, when combined with the other emotions, [is] the basis for all mental processes" (Izard, 2009, p.3). This debate is not only found with the basic emotion theories. While appraisal theorists appear generally to agree that interest is an emotion (Banse & Scherer, 1996; Frijda, 1986; Smith & Ellsworth, 1985), Ortony and Turner (1990) have argued that interest is too cognitive and not sufficiently valenced to be considered an emotion, while Lazarus (1991) described interest, curiosity and surprise as 'pre-emotions', without explaining further what he meant.

Paul Silvia (2005) has argued that interest is an emotion, placing it within appraisal theory. Furthermore he has provided experimental evidence to suggest that appraisals of novelty/complexity and coping potential were sufficient to elicit interest, although he did point out that further research was required to definitely reject other components, (Silvia, 2005). In short, he argued that if an object was new and neither too complex nor too simple to be understood, then it was interesting.

Silvia's two-appraisal model went largely unquestioned until recently (Fontaine, Scherer & Soriano, 2013). The authors of this new research used a paradigm whereby the participants had to imagine a friend telling them an (interesting) story, and then answer questions about what made that story (interesting), how it made them feel physically etc. The authors concluded that, while coping potential was an important component of interest, novelty was not. Rather, it

was components of coping potential, goal relevance and normative significance that were the components of interest.

In research that will not be presented as part of this thesis, we have argued that, not only is interest a type of emotion (Lauria, Dukes & Clément, in review), but it is a special type of emotion: when faced with a particular problem, just as there can be moments of understanding, of 'seeing the epistemic light' and other moments of doubt and despair, of epistemic darkness, we argue that interest is the prototypical *chiaroscuro* emotion where an object is not yet understood, but that there is still a possibility that it will be (Lauria, Dukes & Clément, in prep)[11]. Furthermore, if an object can fill an 'information gap' (Lowenstein, 1994) it also has to be appraised as being 'worthwhile'. In other words, it needs to be seen as good to attend to, to think about, to perceive, to explore etc. In short then, we described interest as being composed of three appraisals, epistemic goodness, informativeness (fills a cognitive gap) and coping potential: something that is interesting has, as their function, potential cognitive improvement (Lauria, Dukes & Clément, in prep).

We argue that just as the formal object of sadness is loss, and that of fear is threat, the formal object of interest is 'informativeness'. As such, we argue that interest is one of a group of emotions whose function it is to find out more, to explore and to be curious, or, to use the collective term we, "the affective springs of inquiry" (Lauria, Dukes & Clément, in prep)[12].

If then, our assumption is correct, that Ekman's main argument against including interest as an emotion is because there is no universally recognisable, prototypical facial expression of interest, it would be worthwhile testing using an emotion appreciation approach, given that we propose that such an approach is a better indicator of whether an emotion is present or not.

[11] This is not to deny the effect of collative variables which will be returned to in the conclusion of this thesis.
[12] This would seem to exclude awe, which may be aesthetic, rather than epistemic in that it is more related to the apprehension of data rather than valuing the data as informative.

1.2.2 Third-party interest detection in infants

A recent study has shown that children as young as 18 months old regulate their behaviour as a function of an expression that the authors describe as 'interest/joy' (Egyed, Kiràly & Gergely, 2013). The study showed that when infants as young as 18 months old were presented with an experimenter who communicated her appraisal of an object to them (interest/like versus dislike/disgust) through smiling at them and calling their name, they were more likely to generalize this appraisal to a second experimenter than when the appraisal had been made inostensively (i.e. if the experimenter had appraised the objects without taking notice of the infant at all). In short, the child 'understood' that this was a preference that others would also have. These results suggest that at 18 months old, affective expressions similar to interest can be transmitted from an experimenter to a baby, creating expectations of how others will act, or at least of their preferences.

But what is not clear is how the infants would react if they were to be left to choose one of the objects for themselves, rather than giving one of the objects back to the experimenter. Nor is it clear if it is the 'interest' or 'joy' aspect of the expression that is promoting the positive behaviour when contrasted with the dislike/disgust expressions.

While our work on the character of interest is on-going and, as such, will not be presented in depth here, if we are able to argue that interest appears to be an emotion, then in order to be able to illustrate that expressions of interest can reliably be the source of inferences by third parties, we clearly must first be able to demonstrate that interest can be recognised by third parties. Given that past research has not convincingly shown that this is the case in adults using facial expression, using more context-based expressions would provide an interesting test of the emotion appreciation approach. If it can be shown that third-parties can reliably recognise interest in more ecologically realistic conditions during which the person-object relations are apparent, we would have empirical evidence as well as a theoretical argument, which may begin

to convince the doubters that interest should be considered an emotion, while incidentally demonstrating the utility of an emotion appreciation approach.

Furthermore, if it is possible for third-parties to recognise and identify interest from among a list of possible emotion-word responses, it would be worthwhile to explore the age at which others' interest can regulate our behaviour – in other words, to evaluate the age from which other people's interest incites us to become interested. While the aforementioned study by Egyed et al. (2013) demonstrated that children can differentiate between interest/joy and disinterest/disgust, a finer distinction should be made. From what age then, can we learn from others that an object is interesting?

The two questions motivated by the literature and our subsequent research on interest are as follows:

1. Can an emotion appreciation approach inform the discussion about interest's categorisation as an emotion? (ch. 6)
2. Can an emotion appreciation approach inform us about the age at which infants regulate their behaviour as a function of third-party expressions of interest? (ch. 7)
3.

1.3 Structure Outline

In this section, I will explain the motivations for each chapter. The first four chapters are described here as *theoretical*, the following two as *empirical*.

1.3.1 Theoretical

Chapter 2: The role of interest in the transmission of social values

The chapter offers an explanation of how cultures transmit not only cultural practices, but also cultural *values*. We articulate how concepts such as joint attention, social referencing and social appraisal might combine to enable children to learn about the values to ascribe to the objects in their environment, and highlight the role that could be played by the emotion of interest in the socialization process. Furthermore, we argue that it is not enough to explain how infants (or newcomers) process information, but that it is also necessary to explain why they process the information that they do – in other words, how they evaluate what is worthy/significant/relevant to them. This explication comes in four parts, the most important of which, in terms of the thesis, is that it can be because the infant (or newcomer) processes the object as a consequence of seeing someone else reacting emotionally to the object. We focus on reactions of interest.

Chapter 3: Social Appraisal and Social Referencing: Two Components of Affective Social Learning

In chapter 2, we briefly describe how the concepts of joint attention, social referencing and social appraisal might combine in the socialization process. But while it is clear that joint attention is different from the other two in that it is usually described in non-emotional terms, it is not entirely clear that a distinction can be made between social referencing and social appraisal. Both relate to using other people's expressions of emotion as a guide to how we should feel about and act towards the objects in our environment. However, although the terms often seem to be used as synonyms, there may be reason to believe that important distinctions can be drawn beyond the fact that social referencing is a term that is almost wholly used in the developmental literature (although see Parkinson, Phiri & Simons, 2012) while social appraisal is almost always used in (adult) social psychology. There is a need for conceptual clarification,

and it is this that serves as the intellectual motivation for this chapter. It is hoped that this search for conceptual clarification could lead to a greater understanding of socio-emotional processes more generally, and perhaps specifically in those that are involved in the socialization process.

Chapter 4: Affective Social Learning structures dynamic, life-long, socio-emotional processes

While the previous chapter will soon be published as a target article in Emotion Review, this chapter is a response to the expert commentaries that were made about it. The motivation of writing this chapter can be found in clarifying points that were brought up in the commentaries with a view to better defining affective social learning.

Chapter 5: Infant interpersonal development: The interconnectedness of emotion understanding and social cognition

The fifth chapter consists of a paper that I wrote with Prof. Eric Walle (UC Merced) and one of his graduate students, Peter Reschke. Having argued until now that learning about the value of objects could be an affective process, we explain the process more clearly here.

We point out that there are certain areas of social cognition that are rife with emotional processes. For example, if it can be argued that individuals make sense of others' actions by inferring underlying mental processes, then it seems to follow that those inferences are probably drawn somewhat from the others' manifestations of emotion.

We point out that certain types of action can be used to predict emotion and that emotion can be used to predict action, indicating areas of developmental social cognition that

appear ripe for this kind of approach. While we are currently empirically testing the examples we make in this chapter, we also hope that this encourages researchers in social cognition to (re)think their paradigms in terms of social affect.

While the title of this chapter concerns 'emotion understanding' it essentially describes what I mean by *emotion appreciation*. Indeed, the term emotion understanding has been used in many different circumstances and has come to mean different things to different people**,** so for that reason alone, this new approach might benefit from being named something else[13]. *Emotion appreciation* then, is the method used to identify the relationship between person and object given the context, and can be used to infer about the nature of the object, the person, or indeed, the context. These first chapters highlight how an emotion appreciation approach can lead to a better understanding of the processes involved in two research areas that, until now, have been relatively affect free – social learning and social cognition.

1.3.2 Empirical

Chapter 6: Looking beyond the static face in emotion recognition: The informative case of interest

As mentioned earlier, Ekman rejects the idea of interest being an emotion (Ekman & Cordaro, 2011), but it is not clear whether he rejected interest simply because he couldn't find a universal facial expression for it or not. This chapter further demonstrates the benefits of an emotion appreciation approach as it illustrates how emotion can be appreciated in the person-object relation, even when it cannot be recognised in the facial expression alone. Specifically it challenges the idea that the emotion of interest cannot be recognised in the other.

[13] This is discussed more in the conclusion to this thesis.

Note however, this was not truly a test of how Ekman's six emotions fared in the four conditions because we had the actresses look off-camera in order to suggest that they were actually looking at something in particular. In other words, whereas Ekman's still photographs are traditionally tested in second-person paradigms (looking at the camera/participant), here the expressions were tested in third-person paradigms, as if the actresses were in a relation with an object. This is an example, then, of an emotion recognition test explicitly using an emotion appreciation approach.

Chapter 7: Interest is in the eye of the beholder

Armed with the results from chapter 6, we felt confident that we had a valid and reliable way to express interest in an object that would be suitable for testing its effect on third-party observers. This study was aimed at determining the age at which infants are sensitive to an expression of interest when making a choice between two objects.

Again, using an emotion appreciation approach, the infants were presented with an adult who acted as if she were unaware of the child's presence while she looked first with interest at one object and then with disinterest at another.

1.3.3 Target questions

As described earlier, emotion appreciation was discovered as an approach post-hoc – after the principal work of the main body of the thesis had been completed. It is clearly not complete, but the need for an end to the orthodoxy has been identified and the reasons for this new approach have been given. Many questions remain of course about its validity and its utility. While some of these questions will be tackled in the conclusion of this thesis, several of them will be tackled in the following chapters.

The following four questions emerged from the introduction and I have included the chapters in which they will be discussed, at least indirectly:

1. What role could emotion appreciation play in learning the value of objects from others? (chapters 2-4)
2. How could emotion appreciation enable us to learn about others' mental states and their likely action? (chapters 2-5)
3. Can an emotion appreciation approach inform the discussion about interest's categorisation as an emotion? (chapter 6)
4. Can an emotion appreciation approach inform us about the age at which infants regulate their behaviour as a function of third-party expressions of interest? (chapter 7)

CHAPTER 2

The role of interest in the transmission of social values*

* Reprint of : Dukes, D. & Clément, F. (2013). The role of interest in the transmission of social values, *Frontiers in psychology, 4*. The authors would like to thank the two anonymous reviewers for their helpful suggestions and Joseph J. Campos and Philippe Rochat for their helpful advice. This work was supported by the National Centre of Competence in Research (NCCR) "Affective Sciences: Emotion in individual Behavior and Social Processes", financed by the Swiss National Science Foundation (SNSF, 51NF40-104897), and hosted by the University of Geneva.

Abstract

The environment is so rich with information that our cognitive system would be overloaded without a way to evaluate what is relevant for our needs and goals. Appraisal theory has shown how emotions, by 'tagging' the environment with differential values, enable the attribution of our attentional resources to what is most relevant in any given circumstances. Most often, however, the different cues triggering the allocation of attention are thought of as purely individualistic, like physiological needs or past encounters with certain stimuli. This approach is perfectly appropriate for objects, organisms or events that, by their intrinsic properties, affect the organism's well being. But for humans, many aspects of the environment are culturally or temporally dependent: a soccer game may be highly relevant to some, but not at all to others.

This paper contributes to a better understanding of the processes by which different elements of our social environment acquire value through our socialization process. We recruit different concepts proposed by developmental psychologists to shed some light on this social acquisition of relevance. The notion of 'joint attention', for example, is particularly important to understand how we are sensitive to the other's focus of attention. Similarly, the term 'social referencing' has been used to describe the process of taking into account the affective reaction to a given stimulus, in order to direct our behaviour.

At the core of this process, called "social appraisal" by Manstead, we propose that a specific emotion plays a major role: interest. Someone else's expression of interest, which seems to be detectable from a very early age, is extremely useful in gauging what is worthy of attention among stimuli that are not inherently interesting. The paper highlights how external sources of information (the life experiences of community members) indicate what is relevant, thus giving access to the social values of that group.

2.1 Introduction

In the long empiricist tradition that characterizes the Western conception of humankind, our inner experience of the world results from successive perceptual contacts with our biological, physical and social environment. In this context, it is hard from a developmental perspective not to think of a baby's mental life as "one great blooming, buzzing confusion", (James, 1890, p. 462). How could it be otherwise in a world of objects and events that overlap and coincide in so many ways? Many of the recent breakthroughs in developmental psychology have been aimed at understanding the relative placidity of babies confronted with a plethora of information that they in fact, master impressively quickly. Everything happens as if babies were naturally equipped for such 'cognitive digestion', either because they can rely on some evolutionary modules to make sense of the information due to some core knowledge — naive physics, biology, psychology or even sociology (Spelke, 1994; Baillargeon, Setoh, Sloane, Jin & Bian, 1994; Xu & Carey, 1996; Wellman &Woolley, 1990; Hirschfeld & Gelman, 1994), or because they rely on powerful "pattern detectors" which enable them to detect correlations and forge hypotheses about the structure of the world (Gopnik, 2010).

These cognitive predispositions, however, are just part of the solution. Even if we imagine that babies are equipped to process in specific ways, how can they assess which information should be processed at any given time? Without a system enabling them to prioritize how to distribute their cognitive powers, the risk of behavioral paralysis is too high.

Appraisal theory provides a possible answer since it describes how not all stimuli are equal to our cognitive system, and how our emotions play the role of "radar antennae scanning the environment", (Scherer, 1994, p. 230). This relative saliency in our environment can be due to the fact that, given our organism's needs, certain stimuli have a high biological significance and are therefore automatically prioritized by the attentional system (Brosch, Sander & Scherer,

2007). For instance, when hungry, the value of food is very high and priority is given to any process leading to the satisfying of this biological need. Other factors are more personal and depend on the individual's history: a given odor or taste for instance, can mobilize a person's attention because it reminds her of a special time with her grandmother. Finally, certain elements of our environment are socially relevant because they are considered as important for the members of the individual's reference group. In certain communities for example, a soccer World Cup Final will thus be lived as though it is a religious ritual, whereas in others, it will be ignored. For all these values, the amygdala seems to play an essential role in filtering what is relevant to the organism, and an event is relevant if it can "significantly influence (positively or negatively) the attainment of his or her goals, the satisfaction of his or her needs, the maintenance of his or her own well-being, and the well-being of his or her species" (Sander, Grafman & Zalla, 2003, p. 311).

In this paper, we will focus on social relevance and, more specifically, on how socio-cultural values pass from socialized to newly arrived social members, i.e. babies. After a brief summary of the component process model (CPM) proposed by Klaus Scherer to describe how we appraise incoming stimuli, we will concentrate on a dimension of the model that has not been given much attention: normative significance. By specifying the nature of this check, we will propose that recent attempts to describe social appraisal are particularly relevant to this topic. More specifically, we will show how the emotion of interest can be essential for the baby to discern what is valued in his or her social environment when it is displayed by significant others. To specify the competences required for 'using' expressed interest to detect what is socially relevant, we will revisit three important notions that underlie the way infants can be influenced by others in their development: joint attention, social referencing and social appraisal. Consequences for the study of the role of interest will then be discussed.

2.2 The social side of appraisal

Nowadays, the Componential Process Model (CPM) is one of the most complex, empirically supported and heuristic models of emotion processing (Scherer, 1984b; 2001; Ellsworth & Scherer, 2003). Its central idea is that emotions play a key role in the way our brains scan the environment and prepare our organism for action (Leventhal & Scherer, 1987). This evaluation is performed by a series of different checks that occur in a sequential order - Stimulus Evaluation Checks (SEC). Everything happens as if the emotional processes respond to the following questions: "(a) How relevant is this event for me? Does it directly affect me or my social reference group? (relevance); (b) What are the implications or consequences of this event and how do they affect my well-being and my immediate or long-term goals? (implications); (c) How well can I cope with or adjust to these consequences? (coping potential); (d) What is the significance of this event for my self-concept and for social norms and values? (normative significance) (Scherer, 2009, p. 1309). These checks, that often occur automatically, unconsciously and effortlessly, are supposed to follow this order.

In this model, relevance detection plays an essential role because it is considered to be a first selective filter that a stimulus or event needs to pass through in order to merit further processing (Sander, Grandjean & Scherer, 2005, p. 322). However, the role played by social factors at this stage remains unclear. On the one hand, the significance of the stimulus or the event with respect to social norms and values is clearly relegated to one of the final evaluation checks. It consists in checking the compatibility with external standards: social norms, values, beliefs about justice, or moral principles (Scherer, 2009, p. 1313). By definition, it requires high-level and comprehensive information, and even "comparison with high-level propositional representation" (Sander et al., 2005, p. 322). On the other hand, the social nature of the relevance process is acknowledged: relevance is about how a given event affects oneself or one's *social reference group* (Sander et al., 2005, p. 319). Indeed, the role of social context in appraisal

has been highlighted by recent work underlining, in the CPM perspective, the role played by the amygdala for relevance. Sander et al. (2003) suggested that the human amygdala work as a "relevance detector" and is activated in presence of social signals such as gaze direction, intentions, group adherence, trustworthiness and facial familiarity. Other works have highlighted the role played by the amygdala when individuals have to evaluate trustworthiness in their social exchanges (Adolphs, Tranel & Damasio, 1998; Todorov & Engell, 2008; Winston, Strange, O'Doherty & Dolan, 2002). Given the rapidity of these relevance detection processes driven by the amygdala (Vuilleumier, 2005; Sander et al., 2003), one can therefore conclude that at least a part of what is social in the CPM does not need reflexive and/or propositional processes.

If the processing of another person's facial or bodily expressions triggers the amygdala, especially when the person is looking directly at you (Conty & Grèzes, 2012), we do not think that these intersubjective situations are the only way that appraisal processes are influenced by the "social". Indeed, relevance is evaluated according to the significance events have for what is valued by the organism. Certain stimuli have high biological significance and are automatically prioritized by the attention system (Brosch, Sander & Scherer, 2007), while others trigger specific evaluations of the environment as a result of personal needs and values (Ellsworth & Scherer, 2003). Social relevance aims precisely at understanding how these personal values are shaped during the development of a person. Admittedly, values do not emerge in a social void. On the contrary, children most likely develop a certain number of their personal preferences and values as a result of the contact they have with their social referents (parents, friends, teachers, coach, etc.). Once this transmission period ends, specific parts of their environment will more or less automatically trigger their attention and interest. For a child born into a family of cyclists, for instance, a champion like Eddy Merckx would be immediately detected in a crowd and this episode would be remembered forever, while on the contrary, the cyclists' hero would stay unnoticed by a family of soccer players. Therefore, depending on the 'attentional' priorities of

their social milieu, an individual's environment tends to be colored by different 'social lenses' that will render certain elements of the world as valuable and worthy of attention, at the same time sentencing the others to indifference and invisibility.

Therefore, it seems very important (even from a psychological point of view) to understand how values, inherent in a given form of life (Clément, 1996), pervade our appraisal system, to the point that it can influence the very beginning of the Stimulus Evaluation Checks. As the following section will show, developmental psychology appears to offer some indications.

2.3 Attending to others

In many senses, the human species is fundamentally a social species. As the anthropologist Clifford Geertz wrote: "human behavior is so loosely determined by intrinsic sources of information that extrinsic sources are so vital" (Geertz, 1973/1993, p. 93). Even if not credulous, children learn most of what they know via others' testimony (Clément, 2010; Clément, Koenig & Harris, 2004). Moreover, the human species is fundamentally altricial: offspring are highly dependent on others for a very long period of time. It is therefore not very surprising that other people's appraisal systems can influence one's own evaluation of events and stimuli.

From a cognitive perspective, newborns seem to be "prewired" for attending to human-like faces (Heron-Delaney, Wirth & Pascalis, 2011; Johnson, Dziurawiec, Ellis & Morton, 1991). This preference may well be due to the fact that there is an evolutionary advantage for babies in treating other human faces as particularly relevant to making sense of their surroundings, given their richness as a source of information. Furthermore, from an early age, babies are increasingly able to follow someone else's gaze (Scaife & Bruner, 1975). For instance, 2 to 5-

day-old newborns can discriminate between direct and averted gaze, and 4-month-old infants' brain activity shows specific neural activity when presented with faces with direct (as opposed to averted) eye gaze (Farroni, Csibra, Simion & Johnson, 2002). A few months later, evidence begins to emerge that infants start looking at the world via others' perspectives. At 12 months, infants are able to detect selective attention when an adult looks at several things but attends only to some part of them (Tomasello & Haberl, 2003). This capacity, called *joint attention*, plays a crucial role in development, notably in language learning. Indeed, it is thanks to joint attention that caregivers and infants can establish what is being referenced, and learn that certain sounds match with objects, persons or events in the shared environment (Tomasello, 2003). From a perceptual point of view, it is therefore very likely that infants are prone to select their objects of attention, at least partially, by aligning their own attention with others' attention.

Beside the ability to take into account others' objects of interest and to be driven to be attentive to the same objects, babies around that age (the end of their first year) start to move around on their own, and they gain new ways of feeding their appetite for exploration. Facing all kinds of new objects, they have ever more opportunities to create mischief. Fortunately perhaps, it is also at this age that they start to rely more on their caregivers' cues (facial expressions, body language and tone of voice) to appraise ambiguous and new events (Klinnert, Emde, Butterfield & Campos, 1986). As Feinman and Lewis (1983) put it, caregivers serve from now on not only as a base of security but also as a base of information. Such social information gathering "is rooted in the ability to appreciate that another individual can function as a conduit for information about the world" (Baldwin & Moses, 1996, p. 1917). In the famous visual cliff experiment, infants dared to crawl over a simulated cliff when the mothers expressed joy or interest (Sorce, Emde, Campos & Klinnert, 1985). This ability that the infant has to disambiguate the emotional meaning of objects in the environment by actively seeking out emotional information from significant others (Hertenstein & Campos, 2004) has been called

social referencing. It is important to highlight the fact that, contrary to joint attention where infants' focus of attention is driven by another's gaze direction, the object of concern for social referencing pre-exists in the infant's conscious field. In a way, the child has already evaluated the object as relevant, and the social information she obtains is essentially used to modulate her behavior towards that object. We propose therefore, a slightly less inclusive definition than Feinman and Lewis (1983, p. 878), who define social referencing as the use of one's perception of someone else's interpretations of a situation to form one's own understanding of that situation. We agree more readily with Pelaez, Virues-Ortega and Gewirtz' (2012) definition of social referencing as "a behavior chain in which the presence of an ambiguous object or event signals the gaze shift of an infant towards another person, typically the mother, whose facial, vocal, and gestural expressions may then serve as discriminative stimuli for a subsequent approach response" (p.23). We therefore endorse the view that social referencing directs behaviour, rather than forms an understanding.

In contrast to the aforementioned cases, there are situations where the focus of a given object or event does not pre-exist the social interaction, or when the evaluation of the object itself is modified by the nature of the social information. Children, for instance, can be intrigued by the way adults are captivated and excited by a soccer game on television (Demers, Hanson, Kirkorian, Pempek & Anderson, 2013); in those families, we can expect children to be sensitive to future soccer related events. On the contrary, the appraisal that underlies an activity like stuffing oneself with ice cream can be modified by a strong and negative emotional parental reaction. Even occurrent emotional reactions triggered by an individual appraisal, for instance, bursting out laughing when seeing an old man stumbling in a bus, can be re-evaluated once the emotional reactions of the other, disapproving witnesses are taken into consideration (Jakobs, Fischer & Manstead, 1997). To refer to these cases where the value of events or objects are modified by the observation of other people's emotional reactions, Manstead and his colleagues (Manstead & Fisher, 2001; Evers et al., 2005) have proposed the concept of *social appraisal*. One

of Manstead's objectives is to highlight the fact that most appraisal theorists tended to favor research that focuses on relatively socially isolated individuals, and on values that are essentially independent from the socio-cultural environment. In contrast, social appraisal highlights the fact that "the behaviors, thoughts or feelings of one or more other persons are often appraised in addition to the appraisal of the event *per se*" (Manstead & Fisher, 2001, p. 222).

Social appraisal can be expected to play a considerable part in a child's socialization, given that there are many events and objects in our social environment that are not relevant in terms of their intrinsic properties, and the fact our social environment is full of objects that arouse considerable interest for certain groups of people, but not to others.

It is only via others' appraisal that the relevance of a particular artistic form, sport, hobby, political engagement, or environmental consciousness becomes salient for the children. However, while there is an abundance of developmental research on joint attention and social referencing, the role of social appraisal has not really been identified in infancy. Compared to social referencing, where others' emotions seem to play a regulatory role in the expression of a behavior by encouraging or discouraging the on-going action, it is most likely that social appraisal necessitates a much finer understanding of the expressed emotion. To play the role of relevancy detectors, others' faces have to be "read" by the children: only a rather subtle interpretation of others' appraisal can help them to detect if an object or event is worthy of attention, on a scale going from 'abhorrent' to 'highly desirable'. In this context, we hypothesize that certain expressed emotions play an essential role by "tagging" certain stimuli with a given emotional valence for the children. Such a transmission of values can be intentional and explicit: parents, for instance, may find that is very important to transmit their love of the arts, or the virtue of politeness, to their heirs. In these cases, parents may resort to what Gergely and Csibra call natural pedagogy with *ostensive communication* to indicate new and relevant information (Gergely & Csibra, 2006; Csibra & Gergely, 2009). It has been shown in such

pedagogical contexts that mothers adapt their voice and speech when talking to young children, speaking "motherese" (Snow, 1972). More generally, adults also modify their movements when interacting with infants such that their actions simultaneously enhance infant's attention and highlight meaningful units within the flow of motion (Brand, Baldwin & Ashburn, 2002). More specifically, when mothers show objects to young children, relative to showing them to other adults, their actions are notably characterized by closer proximity to the partner, greater enthusiasm, a larger range of motion, greater repetitiveness, longer gazes, more turn-taking and greater simplification (Brand, Shallcross, Sabatos & Massie, 2007). However, we argue that not all social transmissions of values rely on such ostensive cues. By observing others, children (and adults) can detect what captures their attention or, on the contrary, what they disregard: an expression of awe or an expression full of scorn, even expressed by an anonymous by-stander, can still be very socially relevant.

For this third-party influence in the ontogenesis of social relevance, we suppose that certain expressed emotions will play an essential role, notably disgust, contempt and interest. We will focus here on interest because (1) it is an emotion that has not yet been extensively studied, (2) it should indicate to an observer what another person appraises as being "worthy of interest", i.e. as *relevant*. Interest is therefore an emotion of crucial importance for social appraisal.

2.4 The role of interest

Given the scope of this paper, we cannot discuss here all the aspects of interest (but see Silvia, 2006). Briefly, interest is the emotion associated with curiosity, exploration, and information seeking (Berlyne, 1966; Izard, 2009; Tomkins, 1962a). According to Silvia, interest as a felt emotion consists of appraisals of novelty (factors related to the unfamiliarity and complexity of an object or event) and appraisals of coping potential (the ability to understand

the new object or event) (Silvia, 2005). Its function is to motivate seeking behaviors, learning and exploration (Panskepp, 2005; Silvia, 2008). One of the important questions in studying interest concerns the existence of a specific expression of interest. This aspect is especially important given our problematic: social appraisal could not take place without cues that enable children to detect others' interest.

The expression of interest has apparently no place among the most renowned and widely used basic emotion stimuli that Ekman considered as universal: happiness, sadness, anger, fear, disgust and surprise (Ekman & Friesen, 1971). Actually, it appears from later research that Ekman had considered including both 'interest' and 'contempt' in the series, but presumably he was unable to find suitable static photographs. However, even if "momentary expressions" are particularly efficient from an evolutionary perspective, Ekman did not deny the important role that "extended expressions" might play (Ekman, 1993). Interest seems precisely to be one of these extended emotions and it is therefore not surprising that even adults cannot recognize static stimuli of interest. This was first identified in a 1964 study where interest was one of eight expressions presented to participants (neutrality, surprise, distress, enjoyment, fear, anger, disgust, shame and interest) and where interest was only more frequently recognized than surprise (Tomkins & Mc Carter, 1964). Interestingly, Tomkins and McCarter report that the actors they had hired to pose the expressions complained particularly about how difficult it was to pose "interest". We had a similar difficulty with the actors that were hired for a study we are currently conducting with adults, as if playing a static interest, contrary to a dynamic one, was impossible. In our experiment, participants are asked to watch pictures or movies and to recognize the staged emotions based on Ekman's basic expressions, including a neutral/calm expression and the expression of interest. Static headshots are not well recognized for interest, particularly when compared to six-second films of dynamic headshots and dynamic whole body shots (Dukes et al., in prep. a, [cf. Ch. 5]). Similar results were found in another study in which four positive emotions (pride, pleasure, joy and interest) were compared (Mortillaro et al., 2011).

Facial expressions of each emotion were taken from the Geneva Multimodal Emotion Portrayal corpus in which each actor was asked to express each emotion several times (see Bänzinger, Mortillaro & Scherer, 2012 for details). Representative facial expressions were then coded using the Facial Action Coding System (FACS). While the four positive emotions could not be differentiated on the basis of the presence or absence of particular Actions Units (AU), they could be differentiated in terms of their temporal dynamics — the sequence and timing of the unfolding expression (see Krumhuber, Kappas & Manstead (2013) for a review of the dynamics of facially expressed affect).

From the perspective of studying the role of expressed interest in the ontogenesis of social appraisal, it will therefore be essential to expose infants to dynamic stimuli. The other important point to be assessed is the "contagion" of the interest. In other words, does the observation of someone being interested by an object cause children to also appraise this object with interest? One of the dimensions is *behavioral.* As interest is the emotion that underlies curiosity, seeking and exploratory behaviors are expected towards an object that has been considered with interest by a third-party. A more subtle behavioral dimension is eye gaze pattern: by using an eye-tracker, we should be able to detect whether an object of someone's interest triggers more curiosity and becomes more visually explored by the participant. Another dimension is the transmission of the emotion itself: when an infant sees a person being interested in something, will he/she start being interested in the same object? Such an inquiry is rather complicated because one has to identify on babies' faces the signs of interest. Actually, several early studies have described the facial expression of interest in babies. One such study argued that babies as young as nine months were able to express interest (Izard, 1980), while another study suggested that infants may facially signal emotions, including interest (Oster, 1978). A further study described several facial movements as indicative of an expression of interest, such as brows raised, brows knit, eyes widened and rounded, eyes squinted, cheeks raised, mouth opened and relaxed, tongue moved, lips pursed (Izard, 1979, as cited in

Langsdorf, Izard, Rayias & Hembre, 1983). Using these indications, Langsdorf et al. (1983) showed that facial expressions of interest predicted the time that the infants spent viewing human or inanimate objects, while Izard et al. (1995) show that expressions of interest were morphologically stable between the ages of 2.5 and 9 months. Another important facet of the expression of interest appears to be the 'body stilling and facial sobering' (Camras et al., 2002) or 'freezing' (Scherer, Zentner & Stern, 2004) that characterizes a reaction to a novel stimulus: the whole body and facial expression remains motionless for a moment after the stimulus becomes known. It has been argued that freezing is a normal reaction to an ambiguous situation, as the person is unsure how to react, and that this is more likely to occur in very young infants who "do not yet have the necessary cognitive mechanisms (nor the stored experiences) to conclusively appraise highly unusual events and to prepare appropriate action tendencies" (Scherer et al., 2004, p. 399). It is as if the organism is 'buying time' to disambiguate the situation before reacting. Of course, the importance that freezing may play in an expression of interest shows again why interest might be more recognizable when presented dynamically.

By putting together what we currently know about (a) the way interest is expressed and (b) the different cues indicating that infants are experiencing the emotion of interest (behavior, eye gaze patterns and felt interest), it is possible to conceive of studies that seek to understand when and how children are able to take into account the attentional parsing of the environment performed by their caregivers. Given that joint attention is assumed to emerge around the age of 12 months (Carpenter, Nagell & Tomasello,1998; Moll & Tomasello, 2004), we suspect that this ability emerges during the second year. Furthermore, as children have been shown to learn a lot about by their social environment by observation alone (Rogoff, 2003), it is likely that this third-party appraisal does not require any ostensive signals from the adults in order to be accomplished.

2.5 Conclusion

The main objective of this paper was to consider more carefully the role played by others in the determination of what is relevant in our surrounding. Apart from some very basic biological values, most of the objects, events and phenomena we consider as worthy of investment in time, energy or resources, we in fact inherit from our social and cultural environment. It seems therefore important to study, in an appraisal theory perspective, the last step of the Stimulus Evaluation Checks proposed by Klaus Scherer: normative significance.

Our feeling is that, via social information gathered by children from very early on, norms and values are so deeply embedded in the appraisal process that even the first evaluation check — how relevant is this event for me? — is marked by the social history of the individuals.

When scanning the environment, some objects or events seem more salient than others. These objects/events are often more salient because they are relevant to the individual's goals. We have shown the importance of an individual's life experience in the detection of what is relevant and therefore their 'choice' of object about which they will appraise. This does not mean that this experience has not been tainted by numerous encounters with significant others who shared, explicitly or not, what they considered as interesting, appalling, or insignificant. But, at a given time, all these life experiences can act as an *internal* source of information when appraising an event. In other situations, the importance of the third person's perspective can be brought to the forefront in the appraisal process: in this case, it is some *external* source of information (the life experience of another person) that will influence the appraisal. Clearly, this third person directs her attention as a consequence of her own life experiences and values, which again were elaborated in contact with others. When these multiple social appraisals happen in a relatively interconnected circle, nothing less than a culture is transmitted and perpetuated.

To study the very beginning of this cultural process and to prepare the ground for experimental studies with infants, we proposed a conceptual gradation in the way children take

advantage of social information in the early stages of their development. From a *perceptual* point of view, babies are sensitive to others' direction of gaze. At the end of their first year, they can detect others' selective attention and join their own attention to those of their caregivers— *joint attention.* From a *behavioral* point of view, they can, at around the same period, actively seek emotional information from significant others to modulate their own behavior — *social referencing*. Eventually, at an age that still has to be determined, infants are able to take into consideration an emotion expressed by another person to appraise an event, object or person — *social appraisal.*

The emotion of *interest* appears to be particularly relevant for studying the onset and development of social appraisal by children. In expressing interest, adults offer important cues about what is salient for them in their environment. We hypothesize that every expression of interest that children can detect on an adult's face and body, enables them to "tag" their environment with different levels of saliency. Social appraisal plays therefore a crucial role for children: it enables them to enter a given society by gaining access to the values that are essential to the members of their reference groups.

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Questions remain, of course, about the distinctions that are drawn here, especially since our own definition of these processes has evolved since this chapter was published. In particular, the distinction we made between the 'behavioural' social referencing and the more 'affective' social appraisal is one that we would no longer endorse in these terms, although, as is described below, we certainly believe there is a case for a distinction to be made.

This very question was a subject of a symposium hosted by Prof David Sander (University of Geneva) at the International Society for Research on Emotion conference in 2013 (organised by Prof Joseph Campos (UC Berkeley) and Prof Eric Walle (UC Merced)). Following the debate, we challenged one of its participants, the afore-mentioned Eric Walle to put his position down in writing, because it seemed so different to ours. The next chapter is the result of that challenge.

In short, our new position is that social referencing is a type of social appraisal: we argue that *social referencing* should be restricted to occasions where a 'knower' communicated ostensively with a 'learner', whereas *social appraisal* should also include occasions when the 'knower' is unaware of being observed (*affective observation*).

But the next chapter goes beyond simply distinguishing between the two phenomena; we place social appraisal with other socio-emotional phenomena under an umbrella term of Affective Social Learning. Indeed, this chapter not only explains more fully certain ideas proposed in the previous chapter, but in terms of the thesis, it describes one facet of what an emotion appreciation approach might achieve – a better grasp of how individuals can learn about value through an appraisal of others. In short, the process is more complete than focusing on faces alone.

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CHAPTER 3

SOCIAL APPRAISAL AND SOCIAL REFERENCING: TWO COMPONENTS OF AFFECTIVE SOCIAL LEARNING*

*Reprint of: Clément, F. & Dukes, D. (in press). Social Appraisal and Social Referencing: Two Components of Affective Social Learning. *Emotion Review*. This work was supported by the National Centre of Competence in Research (NCCR) "Affective Sciences: Emotion in Individual Behavior and Social Processes", financed by the Swiss National Science Foundation (SNSF, 51NF40-104897).

Abstract

Social learning is likely to include affective processes: it is necessary for newcomers to discover what value to attach to objects, persons and events in a given social environment. This learning relies largely on the evaluation of others' emotional expressions. This study has two objectives. Firstly, we compare two closely-related concepts that are employed to describe the use of another person's appraisal to make sense of a given situation: social appraisal and social referencing. We contend that social referencing constitutes a type of social appraisal. Secondly, we introduce the concept of *affective social learning* with the hope that it may help to discriminate the different ways in which emotions play a critical role in the processes of socialization.

3.1 The importance of social learning for humans

Although Jean Piaget insisted on the personal acquisition of knowledge, it is increasingly accepted that a considerable amount of what we believe to be true is acquired via others' testimony (for a synthesis, see Harris, 2012). By interacting with other people (our teachers, parents, friends...), we are able to substantially enrich our knowledge and even to learn new things that would be impossible to discover on our own, like our past history, how the brain functions, or which gods to worship (Harris & Koenig, 2006). Current research on testimony measures the impact of attachment style on such informational exchanges (Corriveau et al., 2009) and provides insights into how children apply with increasing efficiency their "epistemic vigilance" in order to filter the reliability of their sources of information (Clément, 2010; Sperber et al., 2010).

Research by Gergely and Csibra (2006) highlights the fine-tuning that exists between young children and those who would like to communicate knowledge to them. Both parties seem primed for this interactive process. For example, parents use 'motherese', taking care to clearly articulate while using a certain tone of voice to communicate with their offspring (Fernald, 1985), and have also been shown to use 'motionese' by moving in a particular way that makes their intentions more predictable and understandable to the baby (Brand, Baldwin & Ashburn, 2002). Indeed, whether using 'motherese' or 'motionese', the parents employ a number of behaviours to facilitate communication and even very young children seem to be attuned to such facilitators.

But what is it that is communicated here? It has been argued that when we try to signal something to someone, for example, how to eat by using a spoon, we aim not only to communicate the information itself (the action), but also to communicate the very fact that we are communicating something (the intention), thereby readying the intended receiver for the

content of the message (Sperber & Wilson, 1986/1995). Thus by adjusting how we speak and how we move for example, we can communicate ostensively – signalling simultaneously to the baby that we intend to show them something, and that that something is 'how to use a spoon'.

From one side then, adults seem to be naturally predisposed to giving information. From the other side, children are predisposed to receiving information, as they are extremely sensitive to such ostensive communication. This natural receptiveness allows them to develop referential expectations and subsequently to generalise the newly acquired knowledge to similar objects or events (Csibra and Gergely, 2009). This concept, that Gergely and Csibra call "Natural Pedagogy", highlights the sensitivity to the transmission of information of both the child and the adult.

However, newcomers to any social group have not only to learn semantic knowledge - what the components of their environment are, and procedural knowledge - how to use those components, but they also have to appreciate their relevance – what value to attach to those components. Children, for example, often have to observe their caregivers' affective reaction to learn the value of an object, a person or event – in other words, to learn how to feel about them (Clément & Dukes 2013). For example, a wrench could be a highly relevant object in a social milieu where manual work is positively evaluated. In such an environment, a young child using tools appropriately may trigger proud nods from his caregivers, whereas in a different family, such ability may be met with a raised and slightly disapproving eyebrow. In other words, we are not simply surrounded by neutral phenomena; we develop positive or negative attitudes toward the objects in our environment (Schwarz & Clore, 1983). Sociologists have even demonstrated that apparently individual judgements of taste, such as preferring sushi to meatloaf, entail an important social dimension: what appears to be very personal is in fact – statistically – dependent on your social background and socialization (Bourdieu, 1984).

The first objective of this paper is to examine two closely related concepts often used by different groups of researchers to explain an individual's sensitivity to others' emotional

reactions: social appraisal and social referencing. It is hoped that such an analysis will lead to a greater understanding of the underlying processes in the social acquisition of knowledge about how to feel and act in new situations. In fact, we will argue that although there are similarities between the two terms, they are sufficiently different for both terms to be useful and necessary (but see Walle, Reschke, & Knothe, in press, for the opposite view). Indeed, we will argue that social referencing is a type of social appraisal.

The second objective of this paper is to place both these concepts within a new framework of affective social learning. It is hoped that the introduction of this framework will help to discriminate different ways in which emotions play a critical role in socialization, and ultimately, that the framework will provide structure and new impetus for research into the role that affect plays in social learning.

In the first part of this paper, we will begin by considering what is meant by social appraisal before giving a more detailed interpretation on how the term social referencing is understood today.

3.2 Social appraisal

Appraisal theorists have justifiably insisted on the role played by emotions in guiding how our brains scrutinize our surroundings for what is relevant for our well-being, and to prepare our organisms for appropriate action (Leventhal & Scherer, 1987): emotions play the role of "radar antennae scanning the environment" (Scherer, 1994, p. 230). However, it could be argued that appraisal theorists have tended to focus on relatively socially isolated individuals, and on values that are essentially independent from the socio-cultural environment — such as stimuli with high biological significance (e.g. Brosch, Sander & Scherer, 2007).

Campos and Stenberg (1981) first talked about social appraisal when they described the possibility of an "intrinsic appraisal" by an individual of events in their environment, and a "social appraisal" of how others react to those events (Campos and Stenberg, 1981, p.275). However, it took another twenty years until the term was formalized. Manstead and Fischer (2001) developed the concept in a bid to alert affective scientists to the fact that there was too much focus on the individual "intrinsic appraisal" and not enough on the "social" aspects of affect in appraisal theory. They stated that "the behaviors, thoughts or feelings of one or more other persons are often appraised in addition to the appraisal of the event per se" (Manstead & Fischer, 2001, p. 222).

There are, of course, many occasions when we learn through observing the affective expressions of others: the history of social psychology is not short of examples of experiments that have highlighted the fact that the value of events or objects can be modified by the observation of other people's emotional reactions. And although much experimental work has been carried out on social appraisal since then (e.g. Evers et al., 2005; Mumenthaler & Sander, 2012; 2015; Parkinson & Simons, 2009; van der Schalk, Kuppens, Bruder & Manstead, 2015), the definition has hardly needed refining at all.

Naturally, the phenomenon pre-dates the definition. One classic study that exemplifies social appraisal was conducted by Latané and Darley (1968) long before the term was even coined. In the experiment, participants were seated in a small waiting room when smoke began to puff through a vent. In some cases, subjects were not alone but rather with two confederates acting as naïve subjects who did not communicate with the participant. Interestingly, when the confederates shrugged their shoulders as a reaction to the smoke being introduced, participants were much less likely to report the potential danger than the participants who had been alone. The way the participants appraised the situation was regulated by the others' appraisal. Thus the appraisal of the way that others evaluate a situation can play a crucial role in our own appraisal of many emotional events (Manstead and Fischer, 2001).

Social appraisal can happen when someone else's emotion triggers or modifies our appraisal of what is happening (Parkinson & Simons, 2009), and not just when we have a specific goal in mind. Interestingly, this form of evaluation can be rather subtle. For instance, Bayliss and his collaborators found that an object was more likely to be preferred when participants were able to see that someone was looking at it, compared to objects that were ignored (Bayliss, Paul, Cannon & Tipper, 2006). Furthermore, they showed that subjects also appraised the emotion expressed by the gazing face; objects were liked more when the face looking at them was smiling than when disgust was expressed (Bayliss, Frischen, Fenske & Tipper, 2007).

The use of someone else's emotional expression to appraise a given stimulus can also be fast and unconscious. Mumenthaler and Sander (2012; 2015) have shown for instance that emotion recognition could be facilitated when another face in the background displays specific emotional expressions (for example, participants were better at recognizing fear on a face when the background character looked at the targeted face with an expression of anger).

For the purposes of this article, it is important to note from these examples that social appraisal is not limited to cases where an intentional object is manifest. As shown in the studies by Bayliss and colleagues, our attention could be initially drawn to a given stimulus by another

person's gaze. The learner's attention is neither directed towards the object or the facial expression of the other person, but rather to the relationship between the expression and the object. In any case, either the witness may change their appraisal of an object given the other's expression, or sense will be given to the expression of the person by the object of their attention.

Social appraisal then, is a rather general term for instances where other people's (perceived or predicted) affective responses are used as part of the basis for making one's own judgment about an event. (For an interesting review of current emotion research in social psychology, including social appraisal, see Parkinson & Manstead, 2015). We will now give an interpretation of how social referencing is understood today, before comparing the two terms. We will argue that social referencing constitutes a type of social appraisal, although see Walle, Reschke and Knothe (in press) for an alternative view.

3.3 Social Referencing

A series of very influential experiments conducted by a team of researchers, in which Joseph Campos played a major role, provide the basis for what is generally understood today by the term social referencing. In fact, social referencing is closely linked to one of those studies in particular: the "visual cliff" experiment. As the philosopher and historian of science Thomas Kuhn (1962) highlighted, it is often in these ground-breaking experiments that a certain vision of how things are originates: indeed the paradigms not only define specific methods that are recruited to obtain a certain result, but also provide a conceptual perspective on the analysed phenomenon.

The 'visual cliff' experiment was originally designed by Gibson and Walk (1960) with a view to better understanding how young animals (notably crawling babies) perceive depth. Campos and his colleagues developed this study by constructing an apparent cliff with Plexiglas that appeared neither too deep nor too shallow, but at a height necessary to provoke a feeling of uncertainty in the babies (30cm). While the baby started on the shallow side, the mothers, facing their children during the whole process, were instructed to place a toy on the other side of the cliff while smiling towards their children to encourage them to approach. The mothers were then asked to express either a particular positive or negative emotion that they had been trained to give, once the baby had moved within a certain range. In this context, infants as young as 12 months old crossed the cliff when their mothers facially expressed a positive emotion but stayed on the other side when their mothers expressed a negative emotion. Strikingly, for example, not one of the 17 babies crossed the cliff when the mothers expressed fear, while 14 out of 19 babies crossed when their mothers expressed happiness. The authors described the tendency for the infants to look at their mothers for guidance as 'social referencing': "Social referencing, as we have defined it, is a process whereby an individual seeks out emotional information in order to make sense of an event that is otherwise ambiguous or beyond that individual's own intrinsic appraisal capabilities" (Sorce et al., 1985, p.199).

Three principal features of this cardinal study are worth underlining here, given the objectives of this article. Firstly, from the viewpoint of the children, it is important to highlight the fact that the cliff became a point of attention for them independently of any information communicated by their mother - they were on their way to the attractive toy on the other side of the apparent cliff when they met the potential obstacle of the cliff face (Sorce et al., 1985, p.196). In other words, it is as if they were asking, "Is it dangerous, or not, to cross the cliff?". The identity of the referential object (the cliff) was not determined by the mother, but the qualification or evaluation of this referential object is (in this case, "can it be overcome").

Secondly, from the viewpoint of the mother, the nature of the social interaction in which the experiment took place is important: the mothers were at their children's "informational disposal" for the entire duration of the experiment, providing affective testimony about the potential dangerousness of the cliff through the use of maintained visual contact and facial expression. In other words, the mothers were ostensively communicating with their children from the moment that the toy was placed on the deep side of the cliff.

Thirdly, focusing on the relationship between mother and child, it must be assumed not only that both mother and child are aware of the cliff but also that they both assume that the other is attending to the same object. Consequently, social referencing is a case of what Michael Tomasello called "joint attentional scenes", i.e. "social interactions in which the child and the adult are jointly attending to that third thing, for some reasonably extended length of time" (Tomasello, 1999, p. 97). Furthermore, it is interesting to note that the mother is providing an evaluation on behalf of the child – the information that they are communicating is specifically for that child for that particular localised context.

Klinnert first described the term 'social referencing' in her unpublished doctoral dissertation in 1978 (cited in Klinnert, Campos, Sorce, Emde & Svendja, 1983). Since then, experiments on social referencing have been widely used and to great effect, adding a tremendous amount to our understanding of social and affective development. For example, between 6 months and 2 years old, children seem to reference their parents with increasing frequency (Klinnert, 1984; Walden and Ogan, 1988) although interestingly, there is also some age-sensitivity about what kind of affective expression (positive or negative) is referenced more often (Walden and Baxter, 1989). There is also evidence that children may socially reference not just their mothers but also familiarised strangers (Klinnert et al., 1986), and that social referencing may be selective - children appear to reference differently depending on their relationship with the adult (Zarbatany & Lamb, 1985; Klinnert et al., 1986). Social referencing has also been shown to work with facial expressions alone (Boccia & Campos, 1989), vocal

expressions alone (Mumme, Fernald & Herrera, 1996) and with facial and vocal expressions (Hirschberg & Svejda, 1990). Social referencing has more recently been shown to be used successfully by adults (Parkinson, Phiri & Simons, 2012). While these experiments have used a variety of stimuli, settings, emotions, age groups, modalities and more, they are all examples of the large number of studies on social referencing that meet the three criteria that we have underlined as necessary to describe an event as such.

3.4 Comparing social appraisal to social referencing

It has been shown that a lot of what people find worthy of attention depends on their culture (Nisbett, 2003; Kaufmann & Clément, 2014). It seems likely that both social referencing and social appraisal play a major role in this socialization process. The ability to detect what is interesting, worthwhile, pleasant or vile by reading others' affective reactions, even when these reactions are not explicitly communicated, is crucial for "new entrants" in any given community, be they strangers or infants (Clément & Dukes, 2013).

But comparing the terms social referencing and social appraisal directly is a difficult task for a number of reasons. Firstly, contrary to the cliff experiment that has proved so determinant of how social referencing is understood and defined, the term social appraisal is less strongly connected to a specific study. Indeed, some 'classic cases' of social appraisal that do not meet the criteria for social referencing were not even described by those who designed the studies as involving social appraisal at all. Secondly, while most experimentation in social referencing has been conducted on children (although see Parkinson et al., 2012, for a notable exception), studies illustrating the process of social appraisal have largely been conducted on adults.

To summarize, as demonstrated in the earlier examples and as depicted here in Figure 3.1, in social referencing, the learner's principal point of attention remains the referential object throughout, while the knower attends to the affective relationship between learner and object, regulating their own expression to influence the learner's feelings towards the object. However, not all cases of social appraisal meet these criteria. In what we propose to call affective observation, the knower remains attentive to the object, while the learner is attentive to the relationship between the knower and object, learning how to feel about, or value, the object itself.

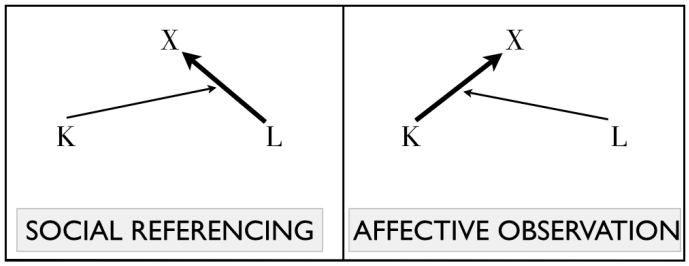

Figure 3.1: The Two Types of Social Appraisal.

In social referencing, an object (X) is the learner's (L) principal source of attention, while the knower (K) attends principally to the relationship between the learner and the object. In affective observation, the object is the knower's principal source of attention while the learner attends principally to the relationship between the knower and object. The arrows depict the principal sources of attention.

Given our perspective, even some studies that have been classically labelled as examples of "social referencing" should be re-labelled as more general examples of social appraisal. The first example comes from an experiment by Feinman and Lewis (1983). Feinman originally described social referencing as "a process characterised by the use of one's perception of other persons' interpretations of the situation to form one's own understanding of that situation. Such interpretations may be explicitly requested, or they may be offered, received, and used although not actually solicited" (Feinman, 1983, p. 446). This definition is clearly much broader than what is understood by the term today and includes both affective and non-affective information, as well as both directly and indirectly acquired information, or in other words ostensively

communicated and observed information. However, it seems important to point out that given their own definition of social referencing at the time, they were justified in describing their experiment as an example of it.

Thus, Feinman and Lewis (1983) present two different experimental conditions as examples of social referencing, one of which does not meet our proposed criteria. In this so-called "indirect influence" condition, 10-month old children were sat a short distance from their mother. A stranger entered the room, and, after a short period, sat down on an empty chair near the child and read a magazine for one minute. While ignoring the child, the mother was then instructed to interact with the stranger either in a positive or negative tone. Thus, any affective information that the child could get about how her mother felt about the stranger would only be indirectly available. The stranger then approached the child, and measures of affective reaction of the child were taken. This condition does not meet the criteria for social referencing that we have pointed out since there is no ostensive communication. However, the second condition featured in their paper – the direct influence condition – does. In this second condition, the mother was able to provide direct affective information to their children about the stranger, while the stranger was present. In fact, the results showed that children were only friendlier to the stranger when their mothers had spoken directly to them about the stranger in positive terms i.e. in the direct (social referencing) condition but not the indirect (observational) condition.

More recently, a similar study has been conducted by de Rosnay, Cooper, Tsigaras and Murray (2006), although this time, the children do appear to regulate their emotions from observing their mother's reactions alone. Mother and child (12-14 months old) sat three meters apart. A male stranger entered the room and talked directly to the mother for 90 seconds, not engaging at all with the child. Depending on the experimental condition, the mother was instructed to react either anxiously or not to the stranger. The results showed that children were significantly more fearful and avoidant of the stranger to whom their mother had reacted

anxiously. There is clearly no ostension from their mothers (the knowers). Similarly, although the mothers are also pretending that there is no joint attention for the benefit of the experiment, there is no affective communication directed to the children at all. Any affective information that the learner could get from the knower had to be taken. This experiment does not then meet the criteria for social referencing but is a good example of affective observational learning: the knower's emotional reactions were appraised by the child in addition to their appraisal of the stranger himself.

3.5 Social appraisal cannot be reduced to social referencing

Conceptual economy is an important aspect of scientific research. While Occam's razor calls for a strict limitation on the number of concepts aimed at explaining a certain phenomenon, precision and specificity are often required for analysing relevant aspects of what we are trying to describe and understand. With these contradictory demands in mind, we ask whether social appraisal and social referencing occupy exactly the same conceptual space and whether it would be better to unite the two phenomena described above under a single concept (as in Walle et al., in press).

Both terms, social appraisal and social referencing, were intended to describe sensitivity to the use of another person's appraisal of a situation to evaluate an event or an object. However, as we have seen, there are important constraints on defining an exchange as social referencing that are not implied for other examples of social appraisal.[14] In 1983, Campos stated: "The crucial aspect of social referencing is that it is one - but only one - instance illustrating the importance of emotional communication" (1983, p. 85). We are inclined to agree, and furthermore, we believe that the original framing of the term social appraisal was intended not only to include occasions when emotion is intentionally communicated by someone as in social

[14] In the article this read, "other examples of affective social learning" which is an error.

referencing, but also when affective expressions are simply observed. Indeed, our position merely makes explicit a position that already exists in the affective literature - the visual cliff experiment has already been used on several occasions as an example of social appraisal (e.g. Parkinson, 2011b; Bruder, Fischer & Manstead, 2014).

We believe that Occam would be sympathetic to our proposal to keep two separate terms for the described phenomena, given the points we have made (but see Walle et al., in press, for an alternative argument). In our opinion, keeping them apart has at least one advantage: not reducing social learning to inter-subjective relationships. This is not to deny that we learn a lot by being involved in deep affective communicative relationships, notably with our parents and caregivers. But such ostensive communications are clearly not the only way to learn about our social environment (see for example, "emotional eavesdropping" in Repacholi & Meltzoff, 2007), notably in most non-western societies (Rogoff, 2003). Young humans are extremely good at learning what they are supposed to like, how they are supposed to behave or feel in a community where they want/need to be included. For example, Judith Harris has shown how young immigrants are able to "forget" their parent's way of life in order to adopt that of their new peers (J. Harris, 2009).

3.6 The ontogeny of social appraisal

One line of argument against our proposal could be to argue that what is known as social referencing in children develops into what is known as social appraisal in adults. However, this seems unlikely, as detecting others' appraisals and subsequently regulating behaviour as a consequence also appears possible in young infants.

For example, Egyed et al. (2013) recently carried out a study in which 18-month old children were presented with an experimenter non-ostensively expressing a preference by

looking at one object with a positive affect (joy/interest) and at another object with a negative affect (dislike/disgust). When solicited, the children then gave the 'preferred' object to the experimenter. Presumably the infant made their choice of object entirely on the basis of the experimenter's appraisal of the object: they used the other person's appraisal to regulate their own behaviour. The child has no obvious prior intention in relation to either of the objects, but even if they did, there is no ostensive communication.[15]

Both the abilities to socially reference and to socially appraise through observation alone appear to develop throughout childhood. While the above example indicates that children as young as 18 months old can understand preference through an affective expression solely by observation, adults can even appraise events taking into account how people who are not actually present might appraise that same object (Evers et al., 2005) – they are taking into account the 'preference' of someone who is not in the process of communicating directly with them (i.e. non-ostensively). As for social referencing in adults, Parkinson and colleagues have argued that "some forms of social referencing also characterize many adult-adult interactions, especially when the emotional meaning of the situation is ambiguous" (Parkinson, Phiri & Simons, 2012, p. 817). Indeed, social referencing is very common in adults: for example, whenever we ask someone to taste the sauce that we are cooking, whenever we ask someone's opinion about the film we want to watch that evening, in fact, whenever we simply ask someone how they feel about something that we intended to do/make, if we can gauge how they feel from their affective reaction, we are socially referencing. Notice that in each of those cases, the person we are referencing will answer to you and for you. The response might be verbal or it might not be, but either way, their expression could mean for example, "I think that sauce is too hot for you", or "I liked the film, but I don't think you would". Just as in the visual cliff experiment then, it is the contextually appropriate information that is given.

[15] While this study provides an excellent example of young infants regulating their behavior as a function of other people's appraisals, it should be noted that what is learned here is how other people (should) value an object, and does not, per se, constitute proof that the participants learned the value of the object for themselves.

Further experimental research will be necessary to determine whether children are able to either socially reference or learn through observation earlier. We feel that the more likely case is that that social referencing is possible earlier in development because the learning environment is more structured in a teacher-student relationship, rather than in a non-ostensive learner-knower relationship. Baldwin and Moses (1996) for example, argue that while 12 month old children may be able to interpret and appreciate some very clear messages, they do not yet understand that other people can be good sources of information: they describe these children as good information consumers but not good information seekers (Baldwin and Moses, 1996, p. 1931). However, it may be the case that some rudimentary learning through observation alone is possible even earlier. In any case, it is clear that both are possible for very young infants and that they are both common in adulthood.

3.7 Conclusion: the "pedagogical line" of affective social learning

In order to elucidate the relationship between social referencing and a more observational form of social appraisal, we propose to place them within a new framework of affective social learning. Figure 3.2 depicts the four principal forms of affective social learning as we see them, while Figure 3.3 illustrates them in terms of attention.

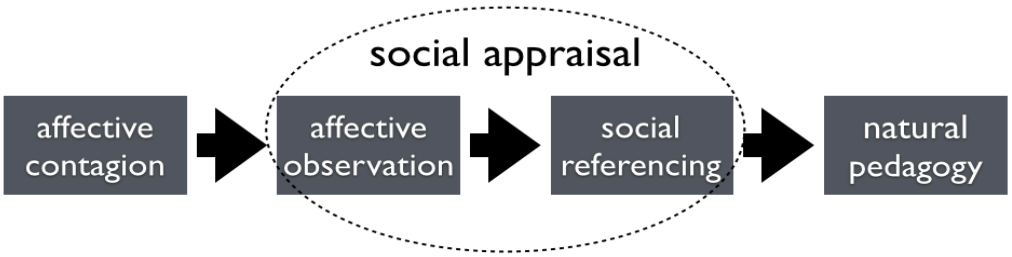

Figure 3.2: The Pedagogical Line

This line represents four stages of affective social learning in terms of the necessary level of intentionality from the 'knower' for affective information to pass to the 'learner'.

The least "pedagogical" situation is a form of minimal transfer of affective information where neither the learner nor the knower is intentionally involved in social transmission: emotional contagion. A mother, seeing her baby approaching a hot oven, for instance, will automatically scream out of fear, triggering a similar emotion in the child. Both the mother and the child "converge emotionally" (Hatfield, Cacioppo & Rapson, 1994, p. 5) and it is very likely that a new appraisal will result from this very affective episode. As an indirect consequence of the mother's scream, the child learns that there is danger, but learns nothing about the object itself. Parkinson (2011b) correctly points out that the main difference between contagion and social appraisal is that a particular object is manifest to both parties in social appraisal, but not necessarily for contagion.

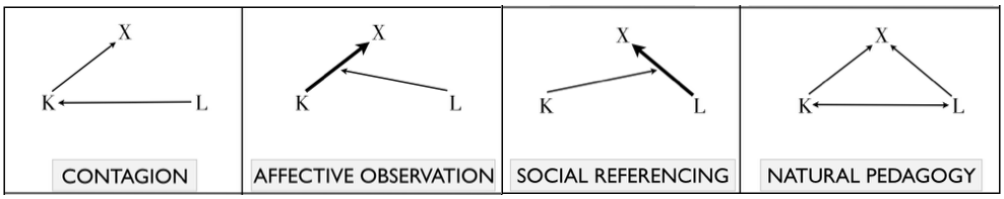

Figure 3.3: Affective Social Learning

The four main types of affective social learning are depicted here. Both types of social appraisal (affective observation and social referencing) are reproduced from Figure 3.1. Here, the knower (K) in contagion has the object (X) as the principal source of attention, while the learner (L) is principally attentive to the knower's reaction. They have no knowledge of the object. In natural pedagogy, the knower shares their attention between the object (the learning material) and the learner, while the learner shares their attention between the object and the knower. The arrows show the direction of attention.

In fact, in general terms, all that is required from the learner in affective observation is a basic motivation to learn without any prior focal attention (something akin to Panskepp's "seeking" system, e.g. Panksepp & Biven, 2012, or Izard's 'interest', Izard, 2009). The information is not necessarily transmitted intentionally by the knower. In other words, the information is not provided explicitly for the learner; the learner can observe an affective

reaction and be informed by the other person's appraisal. For instance, parents can take their child for a visit to a museum. The child, sitting in her stroller and not being explicitly told about what hangs on the walls, can observe that her parents — and a lot of other visitors — are moved by the painting of the young woman with the mysterious smile. The child learns that certain two dimensional coloured objects are especially relevant for people and that they are associated with very positive appraisals.

In social referencing episodes, the learner is confronted by an ambiguous situation and turns to a reference person for guidance. This person of reference, by intentionally expressing an appropriate appraisal with ostension, will enable the learner to evaluate the situation she is facing. For example, we can imagine a young boy in a toy shop with his older brother, wondering whether he should spend his birthday money on a little green car. Turning his gaze to his brother, this latter expresses a disdainful face for his brother's benefit. Quickly, the little brother puts the car back on the shelves. The child learns what value to give the object, and as a consequence, what action to take.

Finally, natural pedagogy has been described conceptually without much explicit mention of affect, although affect seems nonetheless to have a very important role, particularly in ostensive signalling (Csibra, 2010). The teacher, who can answer a request from a student but who most often initiates the learning process, explicitly addresses the student in order to turn her attention to a specific object. According to Gergely and Csibra's natural pedagogy hypothesis, this transmission is facilitated because the knower has a propensity to communicate the information in a particular format. To be able to do this properly, he should be aware of the level of understanding of the learner and modulate his message appropriately. When this intentional process is effective, not only does the object become relevant for the learner, but she can also better use or understand it. However, affect can also clearly play an important role here, as positive emotions such as interest or curiosity may encourage while disinterest or contempt may discourage learning. The learner, for his part, is particularly sensitive to such

episodes of transmission, and tends to generalize whatever information is transmitted to similar contexts. The brother of the boy in the toy store for example, can see a remote control 4x4 car and demonstrates and explains its possibilities to his younger brother. The boy would be very sensitive to the level of enthusiasm and positive effect with which his brother expresses the detailed information about how best to make the car function, thus becoming encouraged to spend his birthday money on it.

This example illustrates a substantive difference between social referencing and natural pedagogy: whereas in natural pedagogy the learner is understood to be receptive to the transmission of information, in social referencing the learner has a more ambitious role – seeking out information for themselves. If our criteria for social referencing are to be accepted, then it must be the case that the child initiates the learning process. While it may be possible to imagine cases of natural pedagogy whereby the infant asks for information, this would become close to what we consider here as social referencing. To summarize then, contrary to social referencing, which is based on emotional signals sought out by the learner, natural pedagogy is not necessarily affective and entails the knower being precise about what he wants to transmit: in this sense, while the affective information in social appraisal can be transmitted quickly and unconsciously (Mumenthaler & Sander, 2012; 2015), the information in natural pedagogy probably needs to be transmitted deliberately and explicitly.

Socialisation will of course include all of these different social learning processes. Our bet is that such finely tuned distinctions could help researchers better understand what is learned, by whom, at what moment and with which results. Further research could for instance highlight the different emotions that can be involved in the learning of what is relevant in any given community. The role of emotions like interest, pride, shame or contempt in the making of social identities is a fascinating subject. It could also be asked whether certain affective social learning processes are more adapted for transmitting certain kinds of knowledge or attitudes toward the social environment: is it ever better to lead by example rather than to explicitly

teach someone? From a developmental perspective, it is important to study the emergence of these abilities and to measure the extent to which young children can rely on each of them to improve their knowledge. It would also be very interesting to compare these abilities with the learning abilities of non-human primates. Apparently, natural pedagogy seems to be absent in non-human primates (Csibra & Gergely, 2011). However, social referencing that meets our criteria has been found in human-raised young chimpanzees (Russell, Bard & Adamson, 1997) and it is very likely that chimpanzees use social appraisal to detect what is relevant in their environment given that they can read attention and intention in third parties (Suddendorf and Whiten, 2001) and that both chimpanzees and bonobos have affective and emotional reactions to their decisional outcome (Rosati and Hare, 2013). Last but not least, the role that the teacher's identity and her specific emotional involvement (or detachment) with the child, has also to be better understood. Different sources of appraisal may compete with each other, giving rise to affective and epistemic tension. Whose judgement should you trust when your own personal happiness is in doubt? Our future often lies in the eyes of the beholder, and others' appraisals can pave the way to heaven… or hell.

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This chapter set out to distinguish between two closely-related phenomena, social referencing and social appraisal. While making this distinction, it became apparent that social appraisal described more that social referencing – that there were certain constraints on describing something as social referencing which were not necessary when describing social appraisal. This argument meant that we had to describe situations that were covered by the concept of social appraisal but which were not social referencing, situations we described as 'affective observation'. Furthermore, we proposed a new concept – affective social learning – which describes the socio-emotional processes involved in the transmission of social values from one generation to the next, or from a particular culture to a relative newcomer.

This chapter will soon be published in the same journal as Prof Walle's paper, and our debate is the subject of three expert commentaries written by Profs Antony Manstead (Cardiff University) and Agneta Fischer (University of Amsterdam), Prof Brian Parkinson (University of Oxford) and Prof Manfred Holodynski (University of Munster). The following chapter is our response to those commentaries and, as the name suggests, underlines the fact that we believe that affective social learning should be seen in terms of the dynamics of socio-emotional exchange and also that it should not be reduced to cases of infant development.

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CHAPTER 4

CLARIFYING THE IMPORTANCE OF OSTENSIVE COMMUNICATION IN LIFE-LONG, AFFECTIVE SOCIAL LEARNING*

*Reprint of : Dukes, D. & Clément, F. (in press) Clarifying the importance of ostensive communication in life-long, affective social learning, *Emotion Review.* This work was supported by the National Centre of Competence in Research (NCCR) "Affective Sciences: Emotion in Individual Behavior and Social Processes", financed by the Swiss National Science Foundation (SNSF, 51NF40-104897).

Abstract

In our attempt to distinguish two types of social appraisal, we (1) clarify the 'knower-learner' relationship in affective social learning, (2) underline the important role that affective observation may have in acculturation processes, and (3) highlight some potential consequences for the recent debate on the benefits of child-directed (ostensive) learning.

In our target article (Clément & Dukes, in press), one of our objectives was to connect two important concepts used in different research fields in order to highlight social processes by which individuals use others' emotional expressions to make sense of their environment (Holodynski, in press). We proposed to distinguish *social referencing* from *social appraisal* by showing that the former is a subspecies of the latter category. Furthermore, we aimed to elucidate this relationship by placing both concepts within a new framework of socio-emotional processes that we call 'affective social learning'.

We suggested that social referencing *necessarily* involves intersubjective communicational exchanges, in the sense that it concerns shared, joint attention on a particular object: both individuals are attending to the same object and are aware that the other individual is doing likewise. Social appraisal, as we point out, is not necessarily shared. Walle, Reschke and Knothe (in press) held the opposing view, arguing that social referencing and social appraisal are 'coterminous' or, in other words, that they are essentially the same concept.

Each commentary pointed out that both target papers agree that social referencing and social appraisal are terms that relate to using other people's affective expressions when appraising an object themselves (Holodynski, in press; Manstead and Fischer, in press; Parkinson, in press). We were nonetheless encouraged to note that each of the commentaries differentiated between the two concepts, and that the distinctions were largely made along the lines that we had drawn.

4.1 Affective social learning is comprised of dynamic and life-long processes

Our use of the terms 'knower' and 'learner' to describe the dyad involved in the transfer of affective information needs to be specified for two reasons. Firstly, it may have unintentionally given the impression that we were talking primarily about the relationship between child and caregiver (Manstead & Fischer, in press). While our target article certainly focused on the ontogenesis of affective social learning (ASL), the inherent processes appear to be influential across the life-span: all of the ASL processes we highlighted can be employed by infants and adults (Clément & Dukes, in press). Thus, ASL should not be reduced to an aspect of child psychology, but rather, we hope, it should inform research on the role of affect throughout the whole life span.

The second reason is that using 'knower' and 'learner' may lead to ASL being interpreted as being comprised of processes of social influence between fixed roles. But as Parkinson correctly points out (in press), emotion exchanges are not static, as when the social exchange develops, each participant may be in the role of 'knower' and 'learner' several times. The concept of "relation alignment" proposed by Parkinson (in press) makes a better job of capturing various sorts of emotional influence in daily social interactions than the more limited concept of "learning". Nonetheless, it seems important to insist on the specificity of social appraisal processes: by taking into account the emotional reaction of others, subjects acquire new information about a given object, event, or person. This information does not have to be very specific. For instance, by simply observing the interest demonstrated by a third party, one can learn that a certain object is potentially worthy of attention. It does not yet imply that the observer will find it interesting, but it could be a first step toward the burgeoning of a new passion, especially when the third party is considered a role model.

Such observation may also play a major role when individuals are trying to adapt to a novel social environment. In the case of migrants, for instance, close relatives or caregivers are not always the most informed about the cultural context where the newcomers will spend the rest of their lives. In these circumstances, third parties identified as successful members of the new community can have, thanks to affective observation, even more impact than the individuals' own parents (J. Harris, 1998).

4.2 The role of ostension in affective social learning

Both the Manstead and Fischer and Holodynski commentaries (in press) point out that the main difference we make between social referencing and affective observation is that the 'knower' may use ostension to intentionally communicate to the 'learner' in social referencing, while the 'knower' may be entirely unaware of being observed in affective observation. While both commentaries agree that this distinction is an important one to make, Manstead and Fischer argue that, "it makes little difference whether the learner's emotional response to a stimulus is shaped by being actively steered by expressive behavior that is deliberately communicated by a knower, or by witnessing the knower interacting with the stimulus and apparently enjoying (or disliking) the experience" (in press, page unknown).

There is, in fact, some debate in the developmental psychology literature concerning the impact child-directed teaching has on the learning process (for a critical review, see Schneidman and Woodward, 2015). Natural pedagogy theory suggests that children have an innate modular learning system that detects when something is being communicated ostensively and that subsequently readies them to learn culturally specific knowledge (e.g. Csibra & Gergely, 2011). Egyed et al. (2013) for example, showed that when infants as young as 18 months old were

presented with an experimenter that ostensively communicated her appraisal of an object to them (interest/like versus dislike/disgust), they were more likely to generalize this appraisal to a second experimenter than when the appraisal had been made inostensively. In other words, when the experimenter smiled at the child and called their name before expressing their preference, the child 'understood' that this was a preference that others would also have. On the other side of the debate, researchers argue that when being directly taught, learning is improved because the child and adult share attention and goals, a process which later helps the child recall the content of the learning (e.g. Moll & Tomasello, 2007; Moore, 2007).

While both sides of the debate argue that there is something special about child-directed learning, Schneidman and Woodward (2015) argue that the experimental evidence gives reason to believe that the only benefit that this type of learning has over observational learning is that it helps children direct and focus their attention. Furthermore, they argue that children that come from cultures where there is less child-directed learning learn culturally important information from observation alone (Schneidman & Woodward, 2015) – in other words, the method by which children learn cultural, generalizable knowledge, could itself be culturally determined.

While the results reported in Egyed et al. (2013) would suggest that there is more than simply 'added focus' to be gained from learning from ostensive communication (as the child behaves differently as a function of how the appraisal is communicated), it seems that the debate about the benefits of child-directed learning over observed learning is destined to continue and the exact value of the distinction between social referencing and observational learning would appear to depend somewhat on its outcome. However, whether or not there is a difference in terms of the lesson that is learned, as Manstead and Fischer (in press) and Holodynski (in press) point out, from the learner's point of view, there is an important difference between whether someone has taught you something about value intentionally or whether you happened upon the affective 'lesson' by a chance observation. Perhaps then, the remaining difference between the

two concepts would primarily concern the source and the intentions of the knower: if someone you trust teaches you something directly about how they feel about an object, it is more likely to make a lasting impression than if someone is trying to sell the object to you, for instance. This sensitivity to the intentions of the 'knower' has even been reported in children as young as 12 months old (e.g. Tomasello, Carpenter, Call, Behne, & Moll, 2005).

4.3 Conclusion

While the general premise of an important distinction between social referencing and social appraisal appears to be condoned by the commentaries here, we hope that the two target articles promote debate and research more generally in socio-affective processes.

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While the previous chapters have focused on the theory of the transmission of social and cultural value, this chapter begins to spell out how that transmission can take place in ways that the orthodox method of emotion recognition cannot account for. Specifically, it illustrates how emotion recognition is more than simply identifying emotion from the face. Indeed, it concludes by pointing out that researchers should not consider their experiment affect-free simply on the basis that the experimenter had a neutral facial expression.

The chapter also demonstrates how emotion appreciation can be used, not only to extend the affective sciences into social learning theory (chapters 3 and 4), but also how it can extend into areas of social cognition.

Although described as emotion understanding in this chapter, an explanation of why I prefer the term 'emotion appreciation' is given in the conclusion of this thesis.

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CHAPTER 5

INTERPERSONAL DEVELOPMENT IN INFANCY: THE INTERCONNECTEDNESS OF EMOTION UNDERSTANDING AND SOCIAL COGNITION*

*Reprint of: Reschke, P.J.,† Walle, E. A.† & Dukes, D. (in press) Child Development. This work was supported by the National Centre of Competence in Research (NCCR) "Affective Sciences: Emotion in Individual Behavior and Social Processes", financed by the Swiss National Science Foundation (SNSF, 51NF40-104897).

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Abstract

Understanding emotion in interpersonal contexts involves appreciating others' relations with the environment. This ability is related fundamentally to social cognition, including understanding the actions and goals of social partners. However, the significance of infants' emotion understanding has been largely underemphasized in recent studies on infants' social-cognitive development. In this review, we highlight the interconnectedness of emotion understanding and social cognition in socio-emotional development. We incorporate a relational view of emotion to bridge empirical and theoretical work on emotional and social-cognitive development, and to demonstrate the utility of this approach for advancing novel areas of inquiry.

Understanding emotion is linked inherently with social cognition. To understand others' emotions is to comprehend the significance of the relations of other individuals with their goals and environment (Campos, Mumme, Kermoian, & Campos, 1994; Saarni, Campos, Camras, & Witherington, 2006). Likewise, social cognition encompasses many emotion-related skills, such as understanding goal directedness (Behne, Carpenter, Call, & Tomasello, 2005), representing intentions (Brandone & Wellman, 2009; Carpenter, Akhtar, & Tomasello, 1998), and evaluating others' needs and coordinating helpful responses (see Buttelmann, Carpenter, & Tomasello, 2009; Warneken & Tomasello, 2009). Thus, it is important to consider how the developmental processes of emotion understanding and social cognition are interrelated.

In this review, we highlight the overlap of emotion understanding and social cognition in infants from a developmental perspective. In our view, empirical and theoretical treatments of social-cognitive development frequently underemphasize the contribution of infants' emotion understanding to their appreciation of others' behavior (see Baillargeon, Scott, Bian, 2016; Woodward & Gerson, 2014; though see also Meltzoff, 2007). The aim of this review is not to devalue research on psychological reasoning in infants, but to underscore how greater consideration of infants' emotion understanding can enrich research on social-cognitive development. In the next sections, we discuss how emotional and social-cognitive development are linked, then suggest opportunities for integrating emotion into research on infants' psychological reasoning.

5.1 Emotion Understanding and Social Cognitive Development

Both social cognition and emotion understanding involve understanding others' goals. Yet confusion often arises when differentiating these constructs. Emotion understanding entails perceiving a significant relation between a social partner and his or her perceived environment,

which may be signaled by an emotional expression (e.g., an angry face; Saarni et al., 2006) or other explicit cue (e.g., persistent and selective actions; see Hernik & Southgate, 2012; Premack & Premack, 1994), or inferred from implicit environmental cues (e.g., situational information; Gnepp, McKee, & Domanic, 1987; Thompson, 1987). In contrast, social cognition is a broader construct in that the motivational states perceived do not have to be relationally significant to the social partner. For example, one can infer goal directedness when observing someone walk out of a building, but the goal may not necessarily be significant to the individual—though it could be if the building were on fire (i.e., inferring fear). Thus, emotion understanding always involves social cognition, whereas social cognition is emotionally relevant only when significant goal relations are perceived. Similarly, while all emotion communication is social, not all social cues are necessarily emotional.

Research on social-cognitive development can illuminate key processes inherent to the ontogeny of early emotion understanding, and vice versa. For example, infants' appreciation of others' affective expressions is likely tied to their capacity to infer others' goals (Walle & Campos, 2012), particularly when such goals are ambiguous (Carpenter et al., 1998). Consider an infant observing another individual knock over a tower of blocks. The individual's sad expression after the tower falls would indicate incongruence with her goal (i.e., the tower was knocked over accidentally), whereas a smile might indicate attainment of a goal (i.e., the tower was knocked over purposely). Identifying the emotional signal (e.g., she is happy) or the goal (e.g., she intended to topple the tower) in isolation falls short of appreciating how the two relate to the outcome (e.g., she is happy because she achieved her goal of knocking over the tower).

The study of infants' understanding of others' actions highlights the coordination of emotional and social-cognitive development. Research in this area exemplifies how investigating infants' understanding of others' emotions and behavior can lead to a richer understanding of social development.

5.1.1 Using Actions to Predict Emotions

Understanding others' motivational states, such as appreciating goal directedness (Brandone & Wellman, 2009; Woodward, 1998), is likely necessary for predicting the emotional consequences of others' actions. For example, infants demonstrate an understanding of successful goals by 6 months (Woodward, 1998), but do not demonstrate an understanding of the emotional consequences of successful goals until 10 months (Skerry & Spelke, 2014). Similarly, infants show an understanding of failed goals as early as 8–10 months (Brandone & Wellman, 2009; Brandone, Horwitz, Aslin, & Wellman, 2014; Hamlin, Newman, & Wynn, 2009), but do not demonstrate emotional expectations for failed goals until 14–18 months (Chiarella & Poulin-Dubois, 2013; Hepach & Westermann, 2013). In these studies, infants' ability to anticipate others' emotional outcomes was predicated on an emerging appreciation of the link between others' actions and goals. This suggests that the development of understanding others' emotions depends on the development of understanding others' goals.

5.1.2 Using Emotions to Anticipate Actions

Infants also use others' emotional communications to anticipate their actions (Barna & Legerstee, 2005; Phillips, Wellman, & Spelke, 2002; though see also Vaish & Woodward, 2010) and coordinate adaptive responses in interpersonal contexts (for a review, see Walle & Campos, 2012). In research using the emotional eavesdropping paradigm (Repacholi, Meltzoff, & Olsen, 2008; Repacholi, Meltzoff, Rowe, & Toub, 2014), 15- and 18-month-olds regulated their imitative behavior of a novel action as a function of whether that behavior had previously elicited an observer's emotional reaction (angry versus neutral) and whether the observer later watched the infant. These studies demonstrate that infants can apply knowledge of an observed negative emotional transaction to future scenarios in which the infant could become the target of a social partner's anger.

Work investigating infants' understanding of others' preferences also illustrates how infants use previously observed emotional information to engage in complex social interactions (Repacholi & Gopnik, 1997). Fourteen- and 18-month-olds observed an experimenter express positive affect after tasting one variety of food and negative affect after tasting another. Only the 18-month-olds understood the experimenter's preference and were more likely to provide her with the favored food, even when her preference differed from their own. This demonstrates that the development of infants' understanding of others' emotions plays an important role in how infants appreciate others' actions.

5.2 Towards Further Integration of Emotion into Research on Social Cognitive Development

The research we have reviewed speaks to the interconnected development of emotion understanding and social cognition, and highlights the value of this perspective for studying infants' social development. Next, we elaborate on three areas of study in which increased integration of these constructs can further such research: understanding goals, engaging in prosocial behavior, and understanding false beliefs.

5.2.1 Infants' Understanding of Goals

Studies often include facial and vocal expressions of emotion to manipulate how infants interpret others' goals. However, in our view, insufficient attention has been given to the potentially facilitative role such expressions might play.

Consider infants' distinct responses to adults communicating differing intentions. Nine-month-olds responded with impatience (i.e., more reaching, looking away) to an experimenter who was unwilling to share a toy, but not to an experimenter who was willing but unable to share a toy (Behne et al., 2005). The experimenter's unwilling, unable, and distracted dispositions were conveyed, in large part, by varying facial expressions accompanying the experimenter's action (e.g., unwilling = smiling while retracting an object; unable = frowning while accidentally dropping an object; distracted = neutral while pulling the object away and talking to another person). We argue that infants' perception of the experimenter's intentions (i.e., their understanding of goals) was enabled by relating the emotion signals they observed to each context.

Similarly, 14- to 18-month-olds observed an experimenter perform novel actions on objects accompanied by the vocalization, "Woops!" (accidental) or "There!" (intentional), both of which were expressed using affective intonation (Carpenter et al., 1998). When allowed to interact with the objects, infants were twice as likely to perform the intentional actions than the accidental actions. These results suggest that infants use others' emotional expressions to clarify the relational significance of others' ambiguous intentions (see also Striano & Vaish, 2006). We would predict that infants lacking such appreciation of emotional expressions would respond similarly to these tasks regardless of which emotion they observed.

Furthermore, goal-directed behaviour alone often indicates underlying relational significance, which can provide infants sufficient information to clarify uncertain action outcomes in the absence of prototypic affective cues (e.g., facial expressions). For example, relational significance can be signalled through persistent actions (see Premack & Premack, 1994), as shown in studies using the behavioural re-enactment procedure.

In one such study (Meltzoff, 1995), 18-month-olds observed an experimenter with neutral facial affect attempt repeatedly, but fail, to perform target actions on novel objects. Infants who observed the failed attempts were significantly more likely to perform the target

action than those who did not observe a demonstration, failed or otherwise. We argue that infants inferred the experimenter's true intention by interpreting the experimenter's persistent actions as frustration with a goal, a relationally significant cue, and thus imitated the intended action. In addition, because emotions often clarify the significance of others' goal-directed actions, including an expression of negative affect by the experimenter after each failed attempt could further disambiguate the experimenter's (failed) intention. As such, we would predict that incorporating negative emotion cues would facilitate increased successful imitation of the intended action, particularly for younger infants who may need more salient cues to interpret the outcomes of others' actions (see Bahrick & Lickliter, 2000).

Conversely, adding positive emotion cues after each action could lead infants to believe that the experimenter's intention was to perform the so-called failed action (see Meltzoff, Gopnik, & Repacholi, 1999). Indeed, in similar imitation paradigms using vocal and facial cues, infants were less likely to imitate actions perceived as accidental (Carpenter et al., 1998) or performed jokingly (Hoicka & Gattis, 2008). Such research highlights the need to examine carefully the effect of emotion signals on infants' interpretations of others' goal-directed actions.

5.2.2 Infants' Engagement in Prosocial Behaviour

Emotion understanding likely plays a role in the development of evaluating others' needs, a skill essential for empathic responding and instrumental helping. Although research often includes emotion signals (e.g., facial displays, vocalizations) in contexts involving overt expressions of distress, findings from studies omitting such expressions suggest that infants also rely on alternative affective cues to evaluate others' needs.

For example, 18- and 25-month-olds observed an experimenter admire and express positive affect toward several objects (e.g., a picture, a necklace). Subsequently, infants witnessed an aggressor steal and destroy the experimenter's objects (harm condition) or a

second set of objects (neutral condition). Infants were significantly more likely to respond prosocially toward the experimenter in the harm condition than in the neutral condition, even though the experimenter did not express distress overtly in either scenario (Vaish, Carpenter, & Tomasello, 2009). We contend that infants' prosocial responses resulted from appreciating the experimenter's previously expressed positive relation with the objects and the aggressor's subsequent disruption of that relation. Thus, visible distress by the experimenter was not necessary for infants at this age to infer her emotional state given the context (though such affective expressions might be necessary for younger infants). Conversely, had the experimenter expressed negative affect (e.g., disdain) toward the objects prior to the aggressor's actions, infants may have interpreted the aggressor's destruction as helpful, if not nonthreatening, and been less likely to subsequently behave prosocially.

We argue that it is not necessarily the expression of overt distress in and of itself that prompts prosocial behaviour, but rather the perception that a social partner is in need, which can be inferred with or without such expressions. Furthermore, infants are less likely to respond prosocially to inauthentic distress (e.g., crying after avoiding hitting one's thumb with a hammer) than to authentic distress (e.g., crying after hammering one's thumb), suggesting that infants evaluate others' affective expressions in relation to the contexts in which they occur (Walle & Campos, 2014).

Studies of infants' instrumental helping also typically underemphasize the regulatory power of emotional communication. Researchers often use experimenters' frustration and disappointment, whether vocalized (e.g., Warneken & Tomasello, 2006, 2007) or expressed facially (e.g., Dunfield & Kuhlmeier, 2013), to create scenarios suitable for intervening on behalf of a social partner. Although such emotional communication likely plays a role in conveying that an individual is in a state of need (see Dunfield & Kuhlmeier, 2013), direct manipulation of these signals is uncommon.

A notable exception is the pioneering work on instrumental helping (Warneken & Tomasello, 2009) in which the intentionality (i.e., intended versus unintentional) of an experimenter's actions was varied as a function of emotional expression. In these studies, 14- and 18- month-olds observed an experimenter perform various actions resulting in ambiguous outcomes (e.g., dropping an object, moving a book, bumping into a cabinet). In the experimental condition, the experimenter responded to the outcomes with grunts, gasps, and repeated reaching and bumping motions, indicating that a goal was frustrated, whereas in the control condition the experimenter responded in a way suggesting that the outcome was inconsequential or intentional (e.g., with playful vocalizations; see supplementary videos in 35, 36; see also 38). We maintain that infants relied on the experimenter's communication of affect to disambiguate his intentions, assess his need, and respond accordingly, an explanation relevant to the aforementioned research on infants' understanding of intentionality (Carpenter et al., 1998).

Recent research has examined more explicitly the role of affective cues (i.e., sadness versus neutral) in eliciting infants' instrumental helping (Newton, Goodman, & Thompson, 2014). Overall, infants responded with equal amounts of instrumental helping, regardless of which affective expressions were observed, suggesting that instrumental cues (e.g., reaching motions) alone were sufficient to motivate infants' prosocial behaviour. Although these findings could suggest that affect does not play a meaningful role in encouraging infants' instrumental helping (see Hepach, Vaish, Grossman, & Tomasello, 2016), this interpretation depends on how emotional information is operationalized in the study. Specifically, we view the neutral condition, in which the experimenter expressed mild surprise and confusion, as laden with emotional information that infants likely used to evaluate the relational significance of the context. Thus, it is difficult to rule out whether the null effect of emotion in this paradigm actually indicates that both expressions (i.e., sadness and surprise) effectively communicated instrumental need and prompted infants' helping behaviour.

To test this alternative view, we suggest examining infants' prosocial responses to an experimenter displaying instrumental cues (e.g., reaching) in conjunction with one of three emotions: affect congruent with instrumental need (e.g., sadness, frustration), affect suggesting that the outcome was intentional (e.g., joy, amusement), and neutral affect (though even a lack of affect can be expressive in some contexts; see Frijda, 1986). We predict that infants would respond most prosocially to negative affect and least prosocially to positive affect, whereas infants' responses to neutral affect, a more ambiguous condition, would likely depend on their developing understanding of nonfacial emotional cues, such as appreciating the situational context (see Gnepp et al., 1987).

5.2.3 Infant Understanding of False Beliefs

How one appraises the environment is closely linked with the emotions one experiences. However, the beliefs underlying such appraisals can be mistaken. Infants understand false beliefs implicitly by at least the end of their first year (Baillargeon et al., 2016) and children can typically reason about others' false beliefs after age 4 (Wellman, Cross, & Watson, 2001). However, research on understanding belief-based emotions is scarce.

Research using verbal tasks indicates that children do not accurately predict the emotional responses of an individual with a false belief until age 6 (Harris, Johnson, Hutton, Andrews, & Cooke, 1989), whereas research using observational measures demonstrates that 2½- to 3-year-olds express suspense (e.g., increasingly opening their mouths, furrowing their brows) when observing an agent act on a false belief (Moll, Kane, McGowan, 2016; Moll, Khalulyan, & Moffett, 2017). Recent research suggests that even infants may understand belief-based emotions. In one such study (Knudsen & Liszkowski, 2013), 12- and 18- month-olds warned an experimenter of the unintended presence of an object toward which she had previously expressed disgust or pain. Interestingly, infants did not warn the experimenter if she

had previously expressed positive affect toward the object, which may have signalled her lack of concern regarding potential future encounters.

Another study (Buttelmann et al., 2009) suggests that infants can reconcile conflicting emotional information when observing a social partner with a false belief: 18-month-olds observed an experimenter express positive emotion toward an object (i.e., a plush toy). Subsequently, infants watched the experimenter express frustration after not being able to open a box that he mistakenly believed contained the object. Infants responded prosocially by redirecting the experimenter to the actual location of the toy. In addition to appreciating the experimenter's (false) belief, we propose that infants relied on the experimenter's positive affect toward the toy to infer his goal to re-establish this relation. However, had the experimenter previously expressed disgust or fear toward the object, infants may have been less likely to redirect him to its true location because doing so would have caused the experimenter distress. Additional research is needed to examine how other discrete emotions help infants respond adaptively to others' false beliefs, particularly when previously observed affect may disambiguate the mental states of a social partner with mistaken beliefs about the environment.

Research using looking-time measures provides additional evidence that infants understand belief-based emotions. Twenty-month-olds expected an agent to respond with a surprised expression instead of a neutral, satisfied, or happy expression upon realizing that she was mistaken about whether a toy made a certain sound or whether a box contained a particular object (Scott, 2017). However, research has yet to explore infants' expectations of others' emotional expressions as a function of on-going false beliefs about the environment. For example, an infant with an understanding of belief-based emotions would expect an agent who mistakenly believes that she has won a game (but has unknowingly lost) to express joy (an emotion matching her beliefs) rather than sadness (an emotion matching the infant's beliefs).

5.3 Conclusion

Emotion understanding and social cognition are fundamentally intertwined. Studying these processes together can provide a more complete picture of how infants navigate social interactions. In this review, we have highlighted specific areas of social-cognitive research that could benefit from closer examination of the role of emotion understanding in infants' appreciation of others' mental states and actions. Our definition of emotion understanding challenges researchers to move beyond traditional methods of communicating affect (e.g., facial signals), and consider alternative, though equally viable, ways that an individual may observe and infer relational significance. As such, it is not valid to assume that omitting canonical affective expressions from a paradigm eliminates the effects of emotion. Furthermore, emotional development likely develops alongside social cognition, and research in one domain will benefit from greater acknowledgment of the other. Studies of infants' understanding of goals, engagement in prosocial behaviour, and understanding of false beliefs represent only some areas in which more careful consideration of emotion understanding can be beneficial. Although some may dispute our perspective, we are confident that opening such a dialog will advance the study of social cognition and emotional development.

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The end of this chapter marks the end of the theoretical section of the thesis. To recap, in chapter 1, I described a large and growing body of evidence indicating that emotion recognition should not be reduced to facial emotion. I drew on research that describes processes in which the emotional expression of others can influence the way that we feel, appraise and act towards the objects in our environment and described some conditions to which these processes are sensitive. Ultimately, I challenged the orthodox approach to emotion recognition by describing how limited it was as an explanation for the processes involved in socialization.

In chapter 2, we outlined these socio-emotional processes more clearly and argued that the emotion of interest might be particularly useful to picking up the most informative aspects of the environment. The importance of emotion in general and interest in particular, in provoking inquiry, is the subject of a paper I wrote with Federico Lauria and Fabrice Clément (Lauria et al., in review).

In chapters 3 and 4, we formalized and structured these processes more precisely, ultimately arguing that social learning theory could be extended to account for the social transmission of value, as well as the social transmission of actions and behaviours. In chapter 5, we argued that there are areas of social cognition that would benefit from recognising how closely related emotion and social cognition are, and that emotion can be 'recognised' in more ways than via the face.

But for the emotion of interest to be of use in socio-emotional processes, it must first be shown that it is possible to recognise the fact that someone is interested in a particular object.

This chapter then looks at different perceptual contexts of interest stimuli in order to identify the conditions under which interest can be recognised. This analysis is limited here to facial and body, static and dynamic conditions and therefore does not consider more relational aspects of emotion recognition as in the previous chapter, nor indeed vocal, verbal or tactile modalities of emotion expression. Nonetheless, it does signal a challenge to the orthodox approach and particularly to Ekman's dismissal of interest as an emotion.

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CHAPTER 6

LOOKING BEYOND THE STATIC FACE IN EMOTION RECOGNITION: THE INFORMATIVE CASE OF INTEREST*

*Reprint of : Dukes, D., Clément, F., Audrin, C.† and Mortillaro, M.† (in press) *Visual Cognition.* The authors would like to thank the participants and students who volunteered for this study and the replication study, the precious help of Nadège Foudon, the two actresses (Pauline Schneider and Sarah-Lise Salomon Maufroy), the director (Paul Walther) and the FACS coders who coded the facial expressions used in this study, Cyrielle Chapuis, Benoît Cano Peuker and Susanne Kaiser. This work was supported by the National Centre of Competence in Research (NCCR) "Affective Sciences: Emotion in Individual Behavior and Social Processes", financed by the Swiss National Science Foundation (SNSF, 51NF40-104897).

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Abstract

A new wave of studies on emotion recognition encourages researchers to look beyond the face as the sole source of pertinent information. One study has proposed that, while there is overwhelming evidence that negative emotions may be differentiated in static facial expressions, postural information is needed to differentiate positive emotions such as pride, love and amusement. We review the most influential of these recent studies before providing some supporting evidence in an exploratory study of a fourth positive emotion – interest. Using the static face condition as a baseline, analysis reveals that interest was significantly better recognised in the dynamic and whole body conditions. Furthermore, interest was recognised as well as the composite recognition rate of the other emotions in the whole body conditions. These results add to the recent calls to move beyond static facial expressions of emotion when investigating how we determine how others are feeling and how they are likely to act next.

6.1 Introduction

Spontaneous behaviour typically unfolds through multiple, nonverbal modalities at the same time. Most, if not all, emotion researchers would probably agree with this statement. Nevertheless, until very recently, most empirical studies of emotion expression focused on a single modality, usually that of facial expression.

However, a new wave of studies is pushing research on nonverbal emotion expression towards a more comprehensive multimodal approach (Aviezer et al., 2008; de Gelder & Vroomen, 2000; Mortillaro, Mehu, & Scherer, 2013; Scherer & Ellgring, 2007; Van den Stock, Righart, & de Gelder, 2007; Watson et al., 2014). The pioneering work of De Gelder and colleagues on the interaction between the body, the face, and the voice in the perception of emotion demonstrated the importance of whole body expressions to alter the perception of emotion from faces and voices (Van den Stock et al., 2007) and the tight relationship between audio and visual processing in emotion perception (e.g., de Gelder & Vroomen, 2000). More recently, a similar shift has occurred in developmental studies, underlining how important it is to consider multi-modal in the early stages of emotion development. For example, research has found that infants as young as 6.5 months old are able to correctly match whole-body and vocal expressions of emotion (Zieber, Kangas, Hock, & Bhatt, 2014) while the ability to recognize emotions from whole-body expressions (without the face) has been demonstrated in pre-schoolers (Nelson & Russell, 2011).

Recent influential studies have not only shown that the combination of facial expressions and bodies can drastically change how even prototypical facial expression of emotions are interpreted (Aviezer et al., 2008), but also that a congruency effect is already present in children as young as 6-years-old (Mondloch, 2012; Mondloch, Horner, & Mian, 2012). Furthermore, research has shown that, in cases of extreme emotional intensity, the valence of the situation cannot be reliably determined from facial expressions alone, but rather, that the process requires

additional contextual information, that perhaps relates to body posture. (Aviezer, Trope, & Todorov, 2012; Wenzler, Levine, van Dick, Oertel-Knöchel, & Aviezer, 2016). Cross-modal perceptual influences have also been uncovered in a recent study that found that emotional information in an unattended modality can disambiguate the perceived emotion of a crowd (McHugh, Kearney, Rice, & Newell, 2012). Other studies have found cross-modal embodiment effects between vocalizations and facial expressions, showing the strong connection between the different expressive modalities (Hawk, Fischer, & Van Kleef, 2012).

There is some debate as to whether or not each modality carries specific information in the context of multimodal expressions. Researchers have used different approaches to investigate this issue, by focusing, for example, on how the synchronization between multiple signals has a facilitation effect in the interaction between mothers and children (Gogate, Bahrick, & Watson, 2000) and on the relative contribution of each modality when they provide conflicting (Massaro & Egan, 1996) or congruent emotional information (Bänziger, Grandjean, & Scherer, 2009; Martinez, Falvello, Aviezer, et al., 2015; Wallbott & Scherer, 1986). While it seems clear and reasonable that multimodal expressions would be better recognized than unimodal expressions, the specific role of each modality remains to be determined (Martinez et al., 2015; Paulmann & Pell, 2011).

An interesting observation formulated in a recent study states that, while facial expressions seem to clearly differentiate negative emotions, a number of postural movements appear to differentiate positive emotion (Campos et al., 2013). The results of one recent, detailed empirical analysis of bodily behaviour in twelve non-verbal expressions of emotion provide indirect support for this observation (Dael, Mortillaro and Scherer, 2012a). Close inspection of the results of the cluster analysis in the study reveals that the six positive emotions were more clearly differentiated by their bodily expression than the negative emotions were. For example, expressions of amusement formed a fully separated cluster while, more generally, the majority of emotion expressions for each positive emotion tended to fall within one cluster that did not

include other positive emotions. Other studies have provided evidence of distinctive gestural signatures of pride (Tracy & Robins, 1994), love (Keltner, 1995) and amusement (Gonzaga et al., 2001).

The emotion of interest (Izard, 1994; Silvia, 2006) provides an excellent opportunity to investigate the relative contribution of different modalities in emotion recognition and to explore the possibility that positive emotions may be differentiated more easily in terms of bodily movements than by facial expressions. Interest was in fact originally included in the facial expressions that Ekman tested for universality before it was eventually rejected from the final list of six emotions (Ekman, 1993), presumably on the grounds that it could not be reliably recognised facially. While the discovery of a prototypical facial expression of interest has so far proved elusive, emotion recognition studies indicate that it might be possible to recognize interest from dynamic multimodal expressions (Bänziger, Mortillaro, Scherer, 2012). Furthermore there are theoretical arguments that interest may have a very important evolutionary function that would justify the hypothesis that its expression should be consistently expressed and recognizable (Clement & Dukes, 2013). In light of this, we have carried out an exploratory study to investigate whether interest is more easily recognized when the whole body can be taken into account, rather than the facial expression alone. Additionally, we have examined whether dynamic presentations of expressions of interest are more readily recognisable than static images.

6.1.1 The facial expression of interest[16]

To our knowledge, the first major study of emotion recognition including interest was carried out over fifty years ago (Tomkins & McCarter, 1964). In their study, the authors

[16] Although we focus on facial and bodily expressions of interest, it is intriguing to note that in a vocal emotion recognition test of 14 emotions, Banse and Scherer (1996) found interest to be the third most recognized emotion, scoring an impressive 75% behind just happiness (78%) and boredom (76%).

adopted a forced-choice paradigm asking observers to recognize affects based on still head photographs of children and adults. Participants in the study were told to consider each one of the stated emotions as an example of a family of emotions. The participants were each given a list of like-emotions. Indeed each of the six traditional basic emotions is found in its 'own' family, while Tomkins and McCarter also included interest ('excited', 'attentive', 'alert'), neutral ('casual', 'emotionless' and 'without feeling') and ashamed ('guilty', 'shy', 'discouraged' and 'feeling inferior'). Results showed that, in descriptive terms, the expression of interest was the least often recognized of all the emotion categories. In terms of the recognition of the expression of interest, Izard carried out a series of studies in 1971, that he more fully described in 1994 (Izard, 1971; 1994). The most relevant study was carried out with a procedure similar to that of Tomkins and McCarter's earlier research. Participants were split into two groups and the participants in each group were asked to place 32 photographs of facial expressions into one of eight emotion categories – interest, joy, surprise, sadness, anger, disgust/contempt, fear and shyness/shame. There were four photographs per category. Each category was defined by a low and high intensity descriptor (e.g. anger-rage, interest-excitement), followed by four synonyms of the basic category. Thus participants were being asked to match the photographs to the different discrete emotions. Only sadness and shyness/shame were recognized (in descriptive terms) less frequently than interest[17]. The results support the findings of the earlier study, positioning interest as comparatively more difficult to recognize than other emotions.

Reeve (1993) carried out a study with adults in which five facial behaviours (eyes closed, number of eye glances, duration of eye glances, eyelid widening and exposed eyeball surface) and two head movements (head turns and head stillness) were associated to self-reports of interest while participants watched short films. In a later study designed to investigate intrinsic motivation, Reeve & Nix (1997) investigated the extent to which five acts of exploration (latency to initiate, comprehensiveness of investigation, richness of investigation,

[17] These high values can be partly explained by the fact that participants were given much more context to the response choice than is usually afforded in forced-choice paradigms.

hand speed and approach-avoidance) and four facial displays of interest chosen from their earlier study (eye contact, eyeball exposure, eyes closed and lips parted) corresponded to self-reports of interest (and other measures) in 60 undergraduates while playing with a spatial-relations puzzle. They concluded that three of their exploration measures were indicative of intrinsic motivation, while only the time that the participants spent looking at the puzzles was a reliable facial display of interest. In fact, having shown that there are (at least) two identifiable but different facial displays of interest that correlated with the self reports (namely eye contact, positively, and eyes closed, negatively), the authors concluded that a coherent cluster of facial interest displays does not exist, given that the two facial displays did not correlate with each other (Reeve & Nix, 1997).

However, Izard and colleagues described an expression of interest in several studies on babies (Izard, 1979, as cited in Langsdorf, Izard, Rayias & Hembree (1983); Izard, 1980), settling for the description of the expression of interest in their infant affective MAX coding system as "Brows can either be raised, in normal shape, or drawn together and/or slightly lowered; eyes may be either widened, roundish in appearance, or squinted; cheeks may be raised; mouth can be opened and relaxed, tongue may be extended beyond the gum line, lips may be pursed" (Matias, Cohn & Ross, 1989, p. 489). Unlike Ekman and Reeve then, Izard's work with children suggests that a facial expression of interest might exist in children, although, as the list indicates, the exact components of the expression are sometimes contradictory.

Rather than investigating whether certain static characteristics may or may not correlate with one another, another approach might be to assess dynamic representations of interest. As noted in one recent study, "it is not the simple presence of an AU that conveys certain information but rather the unfolding of an AU pattern with all its temporal characteristics" (Mortillaro, Mehu, & Scherer, 2011, p. 270). Indeed, the possibility of a dynamic expression of interest would mean that it could include several movements – it could well be

that the eyebrows start in *normal shape* and are then subsequently *drawn together*, for example. Mortillaro et al. (2011) showed that it was indeed possible to distinguish interest from three other positive emotions (pride, pleasure and joy), in terms of frequency and duration of certain action units (AUs). The authors concluded that while "[s]everal features distinguish different pairs of emotions… no feature clearly sets one emotion apart from the others nor distinguishes pride from joy or interest from pleasure", (p.268). Thus, they provide distinguishing features among the four positive emotions but no prototypical characteristics for each expression. Nonetheless, these results support the idea of interest as an unfolding expression - not one that can be distinguished statically. A more recent study (Campos et al., 2013) invited participants to pose expressions of different positive emotions after describing a situation when they had felt that emotion. While 'brow lowering' (action unit (AU)4 from FACS, Ekman and Friesen, 1978) was analysed as being moderately to strongly associated with the expression of interest, none of the other AUs mentioned in their study were rated as being present in the Mortillaro et al. (2011) study. However, as far as we know, the facility with which these posed expressions are recognised has not yet been studied.

6.1.2 The bodily expression of interest

Another important source of information for the recognition of interest may reside in its bodily expression. According to different theorists, interest itself includes an orienting response towards a novel stimulus, and this may be more apparent in the body than in the face. Camras et al. (2002) describe how 'body stilling and facial sobering' characterize a reaction to a novel stimulus: the whole body and facial expression remains motionless for a moment after the stimulus becomes known. Scherer, Zentner & Stern (2004) described this phenomenon as 'freezing'. This facial and body freezing has been described as being more likely to be found in babies and young infants, who may not have the cognitive capacity to disambiguate events and objects in their environment - as if they need to 'buy more time' to appraise (Clément & Dukes, 2013). If this 'freezing' is part of the expression of interest as a reaction to novelty (Silvia, 2005)

or as a moment of attending and identification (Frijda, 1986), it could presumably be best captured in dynamic presentations and would be more likely captured when the whole body is presented rather than just the face.

Furthermore, given that we assume that being interested in something is synonymous with investing further in it, we could reasonably expect that this freezing is followed by a movement *towards* the object, in the same sense that being surprised, scared or disgusted by something may lead to taking a step back. Indeed, Kudoh and Matsumoto (1985) found that an expression of interest was positively related to 'leaning forward' and 'straightening one's back' while negatively to 'turning one's back', 'slowly turning one's head' and 'turning one's head'. Elsewhere, Frijda (1986) argues that the function of interest is 'orientation', that its end state is 'identification' and that its action tendency is 'attending (opening)'. In comparison, in his study of the appraisal structure of interest, Silvia (2005) identifies interest as part reaction to a novel or ambiguous stimulus and part reaction to the potential to cope with the stimulus: if it is too complex or too simple, it is not interesting. Even if they differ slightly, these characterisations suggest that there may be a moment of approach towards, or at least, of exploration of something new or original after a moment of 'reflection'. Moreover, Reeve and Nix (1997) included *approach-avoidance* as a measure of exploration in intrinsic motivation, defining it as "the extent to which the participant drew near" or as "approach" (Reeve and Nix, 1997: 243). Interestingly, this measure correlated significantly with self-reported interest.

One of the few studies that include bodily expressions of interest uses the GEMEP corpus, a database of 18 emotions expressed in different modalities, (Bänziger, et al., 2012). One of the phenomena investigated by the authors relates to the patterns of bodily behaviour that differentiates emotions (Dael, et al., 2012a). The authors found that interest was expressed by a few sets of bodily movements that were uncommon in other positive emotions, and with one pattern exclusive to interest and irritation. The authors describe this cluster of movements: arms resting at side with trunk leaning frontal, combined with asymmetrical one

arm action. They functionally interpreted this cluster as behaviors "represented in the action mode attending" (Dael et al. 2012a, p. 1095), drawing on definitions made by Frijda as 'wanting to observe well, to understand, to pay attention' (Frijda, 1986; Frijda, Kuipers & Ter Schure, 1989). Results are very similar to those of a coding study by Wallbott (1998) in which two trained coders concluded that during actors' expressions of interest, 'lateralized hands/arm movements' and 'arms stretched out frontal' indicated hot anger, cold anger or interest in comparison to the other emotions.

Thus, interest appears to involve a moment of 'freezing' followed by 'approach towards', rather than avoidance of, the new stimulus (Roth & Cohen, 1986). This 'approach towards' is likely either to take the form of leaning or moving towards, depending on the proximity of the object to the person, and its size. It may be possible then that there is a postural signature of interest that is not apparent in facial expressions.

In light of the absence of consensus about the existence of a prototypical expression, we decided to take an exploratory approach to investigate the expressive features of interest by considering the potential role of movement and the relative contribution of the body and the face to the recognition of interest compared to other emotions traditionally considered as having a prototypical facial expression (anger, disgust, fear, joy, sadness, surprise). In order to ensure the validity of our stimuli, comparison is made directly with how the actors portrayed interest facially in terms of previous studies (Mortillaro et al., 2011; Reeve, 1993) and the existing literature on corporally displayed interest is also used as a comparison (Dael et al., 2012a; Wallbott, 1998).

We have taken two steps to make our analysis as clear as possible. The first is to call the static facial condition 'the reference condition' comparing results to it, as a sort of baseline condition. Secondly, we will focus on a comparison between interest and the other emotions combined together (anger, disgust, fear, joy, sadness and surprise). Specifically, we predicted that (1) interest would be better recognized when presented dynamically rather than statically

and (2) that it would be better recognized in the whole body conditions rather than in the face conditions. Furthermore, we hypothesized that the recognition rate of interest will improve more than that of the composite recognition rate of the other emotions when presented dynamically (dynamic face vs. static face) and in whole-body form (static body vs. static face) rather than in the reference condition.

Moreover, and based primarily on Tomkins & McCarter's (1964) results and the afore-mentioned presumptions of Ekman's work, we predicted that in the reference condition (static face), interest would be the least recognized of the expressions. As a comparison, we predicted that there would be no difference between the recognition rates of interest and the composite recognition rates for the other emotions in the dynamic and whole body conditions: not only would the comparative position of interest improve in regard to the other emotions, but interest would also become as recognizable as the other emotions combined together.

6.2 Method

6.2.1 Participants

125 adult volunteers (72 women) were recruited through student groups and by the use of social media. The participants were all French speaking. The average age of participants was 25 years, 10 months, (s.d= 5 years, 8 months), range = 19 - 44 years old. All had normal or corrected-to-normal vision. Sample size was established before beginning data collection and was based on our experience in previous, similar perceptual studies[18].

[18] A replication study was carried out using a between-subjects design and 27 participants for each of the four conditions. The results of that study are strikingly similar to the results reported here and therefore no further comment will be made about the replication study in this text. The results of the replication study are available on request from the corresponding author.

6.2.2 Stimuli and apparatus

The stimuli were presented to the participants using online survey software (Qualtrics). Given the lack of an available prototype for the expression of interest, it was impossible to instruct actors how to pose the expressions to create the interest stimuli. As a direct consequence, and with a view to using the same method for all the stimuli, we employed a technique for producing the stimuli that has been used elsewhere (for example, in creating the GEMEP corpus; Bänziger and Scherer, 2010; Bänziger et al., 2012). A film director, two actresses and studio space were hired. The actresses wore their hair tied back and a simple black round-neck t-shirt and denim jeans. The filming took place in a photograph studio, against an off-white background. The film director was present throughout the process.

As we were primarily concerned with how easily the expression of interest is recognized as a signal of investment in an object or event by a third party, the actresses posed with their eyes averted, as though they were looking at something off-camera. In the dynamic conditions, we asked the actresses to look around for a moment before then fixing the target and reacting to it. Similar techniques for eye-gaze have been used in other studies (for example, Conty & Grèzes, 2012).

For the face stimuli, the actresses were seated and were filmed from their shoulders up. They were instructed to keep their shoulders still and to look to the left or the right, depending on the condition and to act as though they were looking around aimlessly in the general direction of a fixed point on the wall (found at approximately 45 degrees), before fixing the target itself. The actresses were then asked to express the required emotion as a reaction to the target. While they were free to vocalize during their performance, neither of them did.

For the whole body stimuli, the actresses were filmed from their knees to above their heads, walking to the centre of the shot. Again, they were asked to look aimlessly in the direction of the point on the wall. They were instructed to stop in the centre of the shot as they

fixed on the point. Once standing in the centre of the screen, they were instructed to use their whole body to express the particular emotion elicited by the point.

Films of a duration of six seconds were taken for each emotion. For the static conditions, images were chosen from the film when the expressions appeared at their apex. Thus, the static face pictures were the maximum representation of the dynamic face stimuli and the static body pictures were the maximum representation of the dynamic body stimuli. The photos were all sized 1920x1080 with a resolution of 96ppi. Examples of the static interest stimuli are provided in Figure 6.1 below.

Figure 6.1. Examples of Stimuli.

The two photographs at the top are details of the static whole-body interest stimuli. The two photographs below are examples of the static head stimuli.

The emotions included anger, disgust, fear, interest, joy, sadness and surprise, while a neutral expression was included for comparison. The order in which the emotions were expressed was randomized to avoid anticipation in the actresses' portrayal of each emotion. To ensure that the emotions were expressed as ecologically as possible, once the experimental design had been explained to them, the actresses were encouraged to interpret the emotions as naturally as they could. This means that actresses were not instructed or trained to express emotions following Ekman's prototypes, but were free to express each emotion in their most

spontaneous way[19]. The film director worked with each actress throughout the filming, ensuring that they were both comfortable with their portrayals.

6.2.3 Research design

Participants were proposed a within-subjects design: each participant was asked to recognize all of the stimuli. The first independent variable was EMOTION (interest vs. 'other emotions'), which compared interest against all other emotions combined. The second independent variable was MOTION (static vs. dynamic), by which it was tested whether the stimuli were more easily recognized from being presented dynamically (as films) or statically (as photographs), irrespective of whether the face or whole body conditions were presented. The third independent variable was that of MODALITY (face vs. whole body), by which it was established whether there was an advantage in terms of the recognition rates of the expression of interest being presented as 'whole body and face' rather than 'shoulders and face', irrespective of whether the stimuli were static or dynamic.

6.2.4 Procedure

The stimuli were split into two blocks – the two static conditions and the two dynamic conditions. The order of presentation of each block was randomized across the participants, and the order of the stimuli was randomized within each block. It was possible for the participants to take a break between the two blocks if they felt they needed one. If carried out without a break, the experiment took between 25-35 minutes to complete.

Each stimulus was shown for 6 seconds, whether for the entirety of the film or the still photograph. The participants reported their response by selecting the emotion that they felt best described the actress's expression. There was no time restriction.

[19] While the actresses were free to express the emotions as they wished, it is clear that the expressions are still not 'authentic'. As such, it may be that real-life expressions of interest would bear different results.

Apart from the affective responses, participants were instructed to select 'other emotion' if they felt that the actress was displaying an emotion that did not feature on the list. The full randomized list then, was composed of anger (*colère* in French*)*, disgust *(dégoût)*, fear *(peur)*, interest *(intérêt)*, joy (*joie*), neutral (*neutre*), other emotion *(autre emotion)*, sadness *(tristesse)* and surprise *(surprise)*.

6.2.5 Stimuli Validation

The four static expressions of facial interest and the four dynamic expressions of facial interest were coded using the Facial Action Coding System (FACS) by three certified coders (Ekman & Friesen, 1978). When there was a discrepancy, coders tried to resolve it, and when impossible we accepted the code of the senior coder who has more than 30 years of experience. The percentage of AUs observed in the static and dynamic facial expressions are reported in Table 6.1. Table 6.1 also includes the percentages of the AUs that were present in at least 40% of the expressions of interest in the most recent reference study in order to allow a direct comparison with our stimuli (Mortillaro et al., 2011).

The results in the current study are in line with the results from the 2011 study. The only action unit observed more than 50% of the time for expressions of interest in Mortillaro et al. (2011) that doesn't feature in the coding of the current expressions of this study is AU17 (chin raiser, 70%). This difference can be easily explained by the fact that in the previous study, the actors were speaking and this may have increased the frequency of certain AUs, including AU17. With the marginal exception of Nostril Dilation (AU38) no other AUs were coded as present in the current stimuli: in other words, all the AUs coded as present in the current stimuli were listed as having been present in at least 40% of the interest expressions in Mortillaro et al. (2011). Furthermore, as can be seen from Table 6.1, there is more homogeneity

in the dynamic stimuli: both AU4 and AU7 are coded as present in all the expressions. However, the fact that these AUs did not co-occur (they were not displayed at the same point in time) seems to indicate the possibility of a dynamic sequence of movements for the expression of interest. This possibility is supported by the fact that AU1 and AU2 are present only in the dynamic stimuli suggesting that the unfolding of the expression of interest cannot be captured in a single frame.

Table 6.1

Presence of Facial Action Units in the Facial Expressions of Interest

	AU1	AU2	AU4	AU7	AU10	AU12	AU17	AU25	AU26	AU38
	Inner Brow Raiser	Outer Brow Raiser	Brow lowerer	Lid tightener	Upper lip raiser	Lip corner puller	Chin Raiser	Lips parted	Jaw Drop	Nostril dilator
Mortillaro et al. (2011)	.40	.50	.50	.90	.60	.80	.70	1	.50	.00
Static Faces (Pictures)	.00	.00	.50	.75	.50	.50	.00	.50	.50	.00
Dynamic Faces (Videos)	.50	.50	1	1	.50	.50	.00	.50	.50	.25

***Note**: The numbers represent the proportion of occurrence of AUs in the respective category of stimuli. The first row includes the data about the presence of these AUs in the portrayals of interest used in the study by Mortillaro, Mehu, & Scherer (2011). The second and third rows refer to the stimuli used in the present study.*

6.3 Results

Table 6.2 below shows the recognition rates and the false attributions for the static and dynamic facial and whole body stimuli of interest. It is important to remember that the static stimuli were stills taken from the dynamic films.

Table 6.2

Recognition Rates and False Attributions for Stimuli of Interest

	Interest	Anger	Disgust	Fear	Joy	Neutral	Sadness	Surprise	Other
Static Face	.29	.04	.12	.05	.03	.11	.12	.02	.22
Dynamic Face	.55	.01	.07	.02	.01	.10	.02	.05	.18
Static Body	.62	.06	.01	.03	0	.08	.04	.12	.08
Dynamic Body	.75	.01	.01	.01	0	.01	0	.20	.03

Note**:** *The table shows the average proportion of attributions for the four categories of stimuli of interest. The table includes the falsely attributed expressions – for example, the Anger column shows how many times the participants erroneously chose anger when presented with a stimulus of an expression of interest.*

The analysis of the incorrect answers shows that the participants were most likely to mislabel the expressions of facial interest for 'other'. Interestingly, facial expressions of interest were virtually never confused for expressions of joy. It also appears that the participants were increasingly likely to choose surprise as the amount of perceptual information increased, from static face to dynamic face and from static body to dynamic body.[20]

The recognition rates for interest and the other emotions combined (composite recognition rate) were calculated and compared across the conditions (Table 6.3). Repeated Measures ANOVA revealed that there was a main effect of EMOTION, $F(1, 124)=60.540{,}9<.001$, $\eta_p^2 =0.328$, that there was a main effect of how the stimuli were presented, as either faces or whole bodies, MODALITY, $F(1, 124)=51.796$, $p<.001$, $\eta_p^2=0.295$ and as either

[20] This was borne out by statistical analysis. We recoded the wrong answers by attributing a "1" to the trials where participants answered "surprise" and a "0" for any other answers. A logistic mixed effect model was performed on this variable in order to test how the probability to incorrectly answer "surprise" rather any other emotion was modulated by the factors of our design; the fixed effects we entered were MOTION and MODALITY in the model and the random effect we entered was the participants. Results showed the participants were significantly more likely to answer surprise when they made a mistake in the dynamic face condition rather than in the face condition, ($z = 3.487$, $p < 0.001$) and in the dynamic body condition rather than in the static body condition ($z = 1.471$, $p< 0.05$).

still images or videos, MOTION, $F(1, 124)=61.165$, $p<.001$, $\eta_p^2=0.330$. The results are shown in Figure 6.2.

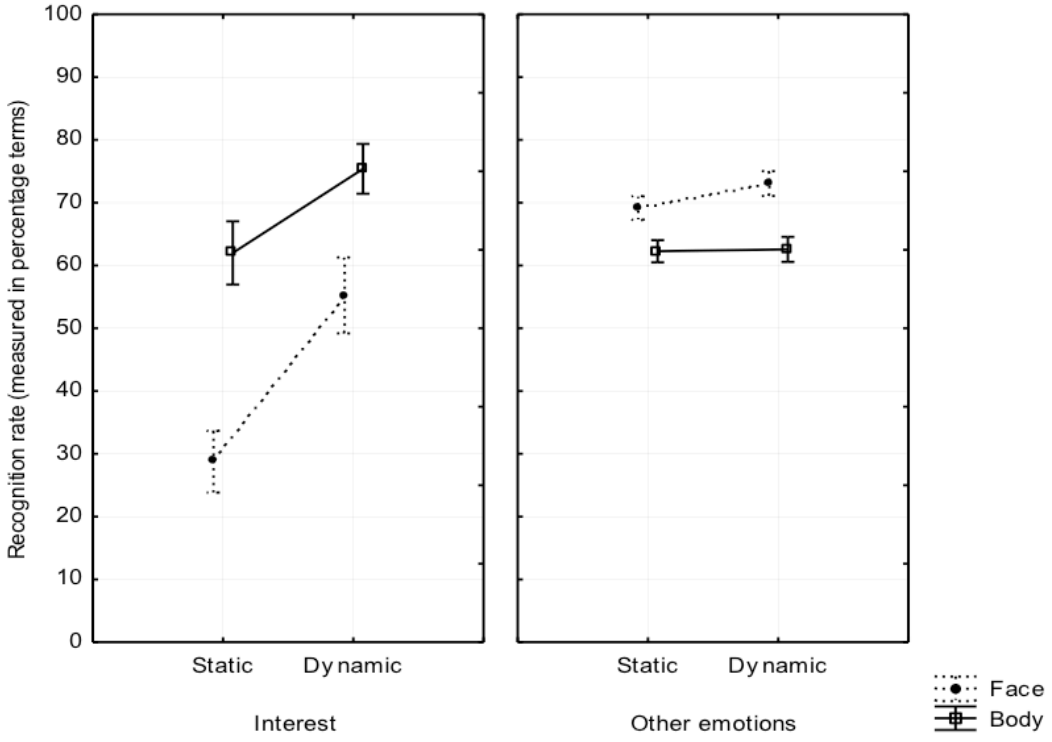

Figure 6.2. Recognition Rate

Recognition Rate (measured in percentage) and Confidence Levels (95%). The average for interest is presented on the left and the composite average of the other emotions is presented on the right.

Further analysis revealed an interaction of EMOTION and MODALITY, $F(1, 124)=195.915$, $p<.001$, $\eta_p^2 =0.612$, an interaction of EMOTION and MOTION, $F(1,124)=53.694$, $p<.001$, $\eta_p^2 =0.302$ and an interaction between MODALITY and MOTION, $F(1, 124)=14.559$, $p<.001$, $\eta_p^2=0.105$. There was also a three-way interaction between EMOTION, MODALITY and MOTION, $F(1, 124) =4.694$, $p<.05$, $\eta_p^2 =0.036$.

To follow up on this three-way interaction, we analysed the effects of MODALITY and MOTION on the interest stimuli across the four conditions. Repeated Measures ANOVA revealed that there was a main effect of MODALITY, $F(1, 124)=127.49$, $p<.001$, $\eta_p^2=0.507$, and of MOTION, $F(1, 124)=64.59$, $p<.001$, $\eta_p^2=0.342$. There was also an interaction between MODALITY and MOTION, $F(1,124) = 9.811$, $p<.001$, $\eta_p^2=0.073$. This means that the

recognition rates for interest improved when participants were presented with whole body stimuli rather than face stimuli, and with dynamic stimuli rather than static stimuli, and this last effect was larger for faces than for whole body expressions.

Table 6.3. Recognition rates across the four conditions for all the expressions

	Interest	Anger	Disgust	Joy	Neutral	Fear	Surprise	Sadness	Composite Recognition Rate (excluding interest)
Static Face	29 (144)	50 (251)	88 (441)	93 (465)	60 (302)	33 (167)	77 (386)	75 (365)	68
Static Body	62 (310)	56 (281)	63 (313)	71 (356)	81 (406)	55 (276)	88 (439)	41 (203)	65
Dynamic Face	55 (276)	54 (286)	78 (389)	85 (424)	76 (380)	62 (308)	80 (400)	81 (403)	74
Dynamic Body	75 (377)	51 (254)	61 (307)	62 (309)	82 (408)	68 (340)	86 (429)	48 (238)	65

Note: *Scores are given in percentage (and in raw) terms. The column 'Composite Recognition rate' refers to the composite average score (in percentage terms) for all the expressions (including neutral) except interest in each condition (calculated as the average of the recognition rates of the other emotions). This 'Composite Recognition Rate' score was the score against which the interest scores were measured in raw terms.*

To compare interest with the other emotions, we calculated the difference in recognition rates for both interest and the other emotions combined between the static face condition and the dynamic face condition, and between the static face condition and the static whole body condition. These differences were then compared with a view to testing whether the gain was greater for interest than for the combination of the other emotions. We analysed the relative gains for MODALITY and MOTION. The results are displayed in Figure 3 for both interest and the combination of the other emotions. It can be seen that the relative gain in recognition rate for interest in being presented either as a whole body or dynamically rather than in being

presented in the reference condition is greater than the equivalent gain for the other emotions combined together.

Planned contrasts with the reference condition revealed that the improvement in recognition rates for interest was greater than for the composite recognition rates of the other emotions when being presented in the whole body format (MODALITY), $t(124)=11.59$, $p<.001$, and when being presented dynamically (MOTION), $t(124)=6.39$, $p<.001$.

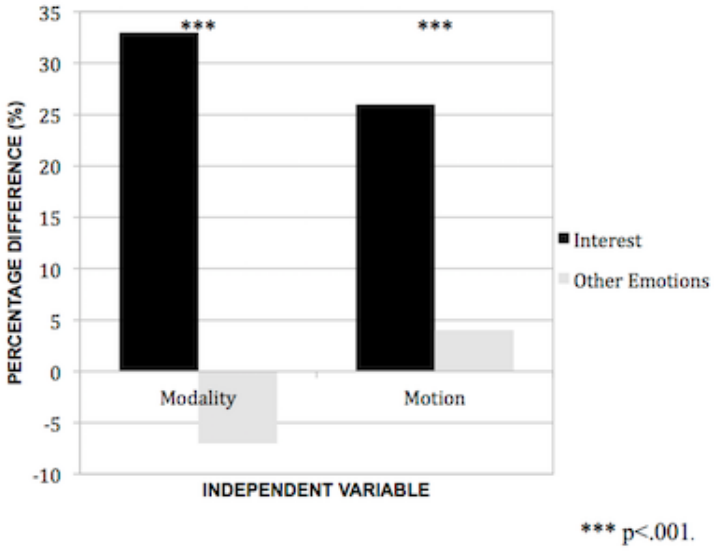

Figure 6.3: Comparative Differences

Difference between interest and the composite average of the other emotions in MODALITY (static body minus static face) and MOTION (dynamic face minus static face) in terms of percentage of recognition rate.

We compared the recognition rates for interest and the average recognition rates for the other emotions across all conditions: the other emotions were more easily recognized than interest in both the static face condition, $t(124)=16.57$, $p<.001$, and the dynamic face condition, $t(124)=5.96$, $p<.001$. There was no difference between the recognition rates of interest and the other emotions combined for the static body condition, and interest was more frequently recognized than the other emotions combined in the dynamic whole-body condition, $t(124)=6.26$, $p<.001$.

6.4 Discussion

In real life, emotional expressions only rarely need to be recognized 'instantaneously' and without any contextual cues – environmental, temporal, corporal, audible etc. In light of this fact, combined with the new possibilities provided by technological progress, emotion recognition studies are progressively broadening their focus, considering videos in lieu of still pictures, and multimodal expressions instead of facial expressions in isolation. One consequence of this broadening of focus has been an increase in the number of emotions considered in research on emotion recognition and in particular of positive emotions. Some of these studies led to the hypothesis that positive emotions may be reliably recognized and differentiated from one another when their expressions are presented dynamically and in whole-body form (Campos et al., 2013, Dael et al., 2012a). Our results support this recent hypothesis by indicating that interest may be more easily recognized in perceptual conditions that are more ecological (with a view of the whole body and movements) when it is at least as likely to be recognised as the six more traditionally tested emotions combined together. It should be noted that by comparing interest against a composite average of emotions allows us to discuss the findings concerning interest but inevitably leads to masking the individual patterns of frequency with which each of those other emotions is recognized.

Given the results here and in earlier studies, it could be argued that no static facial prototype of the expression of interest exists, and that is why none has been found to date. Certainly, the dynamic presentation of the facial stimuli resulted in improved recognition rates, and this may indicate that it is the unfolding and the sequence of facial movements that makes recognising interest easier: maybe an expression of interest has two components, a reaction to

novelty, reflected perhaps by AUs 1 and 2, and then a further commitment to investigation reflected perhaps by AUs 4 and 7. This is reflected in a changing expression.

As for the static presentation, our face stimuli were recognized around 30% of the time. Besides recognition rates, there are two other criteria to assess whether a stimulus is valid or not; the first criterion is to compare the expressions themselves with previous expressions in terms of action units. We found that our expressions are to a great extent in line with previous studies for which FACS codes of interest expressions are available. The second criterion, although more indirect, is to compare the recognition rates with earlier examples of stimuli purporting to represent the same expression.

But as stated earlier, Ekman abandoned his search for a universally recognizable expression of interest in static facial form (e.g. Ekman & Cordaro, 2011), Reeve and Nix doubted such an expression's existence (1997) and Mortillaro et al. said that there was not one feature that could distinguish interest from a set of positive emotions (2011). This would suggest, at the very least, that it is very difficult to recognize the static facial expression of interest, but, more controversially, that there may be no such thing as a prototypical static facial expression of interest.

However, Tomkins & McCarter (1964) found that interest was recognized about 58% of the time in their static face condition, while Izard (1971; 1994) recorded an average of 78% and 67% for his two studies over his four photographs. All of these figures are considerably higher than the 29% obtained here. Although the improved scores in those studies could probably be explained by the simple fact that they used photographs that were more readily recognisable as interest than the stimuli used here and in the previous studies mentioned, they could also be explained by the fact that their participants were presented with a list of a family of emotions, of which the named emotion was the principal one, rather than just the simple emotion-word as was used here; Tomkins and McCarter's method, also used by Izard, gave more context than is normally associated with emotion recognition paradigms, as each emotion category was more

clearly elaborated. In the Tomkins and McCarter 1964 study, for example, the interest group also had the labels 'excited', 'attentive' and 'alert' attached to it. Any one photograph that looked like an expression of interest, excitement, attentiveness or alertness was chosen as belonging to that same category. It could be that the participants recognized a given expression as 'alert' and, had 'alert' not been explicitly stated as belonging to the 'interest family', the participants may have been tempted to put the alert expression with 'fear' or 'surprise'. The method of including families of expressions thus makes the target expression much 'larger to hit' by the provision of some semantic context. Also, while Izard reported all of the results (albeit 23 years after the test was carried out), Tomkins and McCarter only reported the results of the three photographs for which there was the greatest consensus: had they presented the average results of the seven photographs with which their participants were presented, the reported score would necessarily have been lower.

In any case, in spite of these differences in experimental design, the comparative position of interest remained the same: in fact, as far as we are aware, when interest has been part of a static facial emotion recognition task, it has almost always fared less well than all of the more traditionally tested emotions featured here. With that in mind, we could argue that the static facial stimuli used for this study represent *fragments* of expressions of interest: only the provision of contextual information can permit the assembly of these fragments to be recognized as the full expression, that is, when they are presented dynamically or in whole body format. Reeve (1993, p. 373) came to the same conclusion, stating that "to portray the full face of interest, it seems necessary to supplement the [elements] which can be portrayed in a still photograph with an over time display... which can best be portrayed in a multiple-second videotape".

Whether a static facial prototype exists or not, our results show that presenting the stimuli in a dynamic format considerably increases the accuracy of recognition. This is in line with other recent studies that put forward the importance of dynamics for emotion

perception (Krumhuber, Kappas & Manstead, 2013; Bänziger et al. 2012; Nelson & Russell, 2014). In fact, our results indicate that the relative gain for interest when presented dynamically rather than statically was significantly higher than the one for the composite average of the other emotions[21]. This again suggests that there is probably something about the behavioural expression of interest that cannot be easily grasped with one picture. If we turn to appraisal theory and models, interest has been described as characterized by appraisals of novelty and coping potential (Silvia, 2006). Freezing is a response to novelty that aids sensory acuity, and, if we are to incorporate Silvia's model of interest, could also buy the time to judge how easy it is to 'cope with' the stimulus. If the object is then appraised of being worthy of further attention, this freezing behaviour is followed by an approach response as interest develops, enabling exploration and investigation. For example, imagine a picture of someone with their eyebrows lowered (AU4) and the eyelids tightened (AU7). It might not be clear if the person is expressing interest or if they are squinting (because of bright sunshine, for example). However, if there were a short film of that same person freezing to look at something before 'squinting', it would be much clearer that this person is reacting with interest to a stimulus rather than as a physiological reaction to light. The snapshot might look exactly the same, but the dynamic component of the film provides vital contextual information. In summary, someone may freeze to look at something because it captures his or her attention. By leaning in or approaching, the person is making a further commitment: the object is not just attention grabbing – it is interesting.

A recent study has shown that body cues rather than facial expression can be used to discriminate between intense positive and negative emotions (Aviezer et al., 2012). In

[21] It could be that a dynamic presentation of the expressions did not affect the recognition of all other emotions the same way. For example from a qualitative analysis of Table 3, it seems that the facial expressions of anger, fear, surprise and sadness benefit from being presented dynamically, while the facial expressions of disgust and joy do not. Meanwhile, in the body conditions, only fear and joy seem to change particularly when represented dynamically – joy is less well recognized while fear is recognized more frequently. Clearly it would be interesting to speculate about the reasons for the specific patterns uncovered here, but testing of these speculations and hypotheses is beyond the scope of the current manuscript. Furthermore, to carry out such analysis would entail the creation of many more stimuli and require testing that would be statistically inappropriate in our experimental design.

2004, Tracy and Robins briefly describe a study (in a footnote) where they set out to test whether pride could be recognized from the face alone (Tracy and Robins, 2004: 196). None of their facially expressed pride stimuli was recognized at greater than chance level. Their conclusion was that both the face and the body are necessary to recognize an expression of pride (although see Nelson and Russell (2014) for evidence to the contrary). Similarly, in the present study, it was only when presented in whole body form, that interest was (at least) as well recognized as the average of the other emotions. Our whole body stimuli have several similarities with the descriptions of body movements of interest given in previous studies (Dael et al., 2012a; Wallbott, 1998): actors are either leaning their face or head and chest forward while only one of them doesn't have their hands by their sides, but rather, on their legs before them. They also appear to have taken a small step forward. This could suggest that the extra information which is available to the participants by presenting an expression dynamically, rather than statically, exists already in the static whole body stimuli, as if the static whole body stimuli includes dynamic information - with one foot forward, leaning forward (Dael et al., 2012a). Perhaps counter-intuitively then, a static photograph of the whole body captures the 'freezing' just as well as a short film.

The Ekman photographs have been used extensively in affective science and beyond as representations of basic emotions. The original idea was that these six emotions – anger, disgust, fear, joy, sadness and surprise – were universal signals of how the individual felt and that could be 'read' by others to predict the behaviour of the expresser. Joy has traditionally been argued to be the only positive member of the basic emotion group but this claim was essentially only based on studies on facial expression[22]. Given the high score of most of the static body stimuli of interest in the present study, it is also more likely that a prototypical expression of interest may be found in a composite of body and face rather than facial expression alone. Thus, it may well be that interest follows the same pattern as pride. Future research is

[22] Surprise has sometimes been argued to be a second positive emotion, but see Noordewier and Breugelmans (2013) for a convincing explanation of why surprise is initially more likely to be negative than positive.

necessary to determine whether interest and other positive emotions more generally have a distinctive gestural signature and the importance of that gesture being dynamically presented.

If we accept the theory that emotions are essentially social signals, it would seem that we have to communicate positive emotion more 'loudly' than negative emotion for them to be perceived, that is, that the communication requires the whole body and not just the face. Perhaps, from the perceiver's side, it has been more important to be able to differentiate negative emotions from one another: in evolutionary terms, if all the positive emotions meant that there was no immediate danger, perhaps one facial signal of 'all clear' has been sufficient. While it is probable that it is of evolutionary significance to be able to immediately distinguish between fine-grained facial reactions of anger, fear, disgust and even sadness (in the case of a sudden loss), it doesn't make as much sense in such terms to be able to instantly distinguish between happiness, joy, pride, pleasure and interest, as they are much less likely to need an immediate and vital response. For example, even though being able to recognize interest in a third-party may well be vital for successful living, in terms of being aware of accepted behaviour and valued items in any particular culture, it can hardly be described as being 'immediate and vital' to detect an expression of interest (Clément & Dukes, 2013). It would follow, then, that no such static facial signal of interest (or pride, joy etc.) has either developed or is recognizable. Nevertheless, the very fact that such positive emotions can be distinguished through facial expression and context, or a combination of facial and body expression, underlies their importance for general well being.

The current study was intended to highlight the new and increasing number of studies dedicated to looking beyond the static face modality when considering emotion expression. The empirical component of this study is exploratory in its nature, with only two actresses, and a limited number of stimuli. Furthermore, the results would have been more readily comparable across conditions had only one recording shoot been used; as it stands, it is possible that the facial expressions were more (or less) recognizable in one of the two shoots.

Nevertheless, it appears to confirm that the static facial expression of interest is very difficult to recognize while hinting at the possibility that dynamics and bodily movements can make interest as easily recognizable as the other, more traditionally used emotions. This study contributes to the growing body of literature that argues for a more global study of emotion expressions in which still photographs of faces are only one of the many options available to investigate the emotion expression and perception processes, and, that at least in some cases, it is not the most appropriate one.

XXXXX

This chapter challenges the focus on facial expression by highlighting the case of the emotion of interest that, similarly to other positive emotions, appears to be more easily recognised when presented in whole-body conditions. It therefore illustrates the point that emotion can be recognised in conditions that do not rely on static facial representations. Presumably then, when seeing people displaying the expressions described in this chapter, the observer would be inclined to consequently react accordingly. It might be that someone showing interest in something leads to the observer becoming more interested in it. Alternatively, if someone who is hierarchically dominant in terms of knowledge or resources becomes interested in the object, perhaps it is better to become interested in something else.

The next chapter looks at this point more directly in a developmental paradigm. The experiment sets expressions of interest against expressions of disinterest, and 'asks' 9-, 12- and 15 month infants to choose which object they would like to investigate further.

XXXXX

CHAPTER 7

12-MONTH OLDS CHOOSE OBJECTS PREVIOUSLY LOOKED AT WITH INTEREST WHILE 15-MONTH OLDS CHOOSE OBJECTS PREVIOUSLY LOOKED AT WITH DISINTEREST*

* Dukes, D. (in prep) The author would like to thank Iris Mauss and Qian Wang for their comments on a previous version of this paper. The author would also like to thank Nadège Foudon (NF) for her help in collecting the data.

Abstract

Being able to recognise expressions of interest in a third-party is a very important skill when evaluating what is important and relevant to others. This skill may be especially important in children as a means to becoming socialized. We observed object preferences made on the basis of expressions of interest and disinterest to determine the age at which children recognised and responded to these expressions of interest. In this object-choice paradigm, children witnessed an adult looking at one object with interest and another object with disinterest before being invited to choose one of them. While the expression did not affect the choice of infants aged 9 months (n=23), infants aged 12 months (n=23) behaved as expected, choosing the object that had been looked at with interest at greater than chance level, while the 15 month old infants, rather surprisingly, choose the object that had been looked at with disinterest at greater than chance level. Several possible explanations are explored, of which the cognitively least demanding is that the 15- month-old children found the expression of disinterest more motivating for exploration than the expression of interest.

7.1 Introduction

Newcomers to any culture have not only to learn about the *nature* of the different components of their environment (semantic knowledge) and about how to *use* those components (procedural knowledge), they also have to understand how the members of their new cultural group *value* those objects (Clément & Dukes, 2013 ; Clément & Dukes, in press). For example, they need to learn whether is it important to smile when meeting someone for the first time, acceptable to laugh at certain jokes, be disgusted by particular social ills or to be proud of one's country. The specific ability to recognise an expression of interest in a third party may play a critical role for newcomers, as such expressions can make transparent what is significant (or not) to the individuals of the new group. In other words, being able to recognize interest may play a vital role in the transmission of social value, and as a consequence, such an ability is necessary for successful socialization (Clément & Dukes, 2013).

Just as the newcomer learns about their new environment through others' affective expressions of interest, an infant may learn about theirs. Given the key role that interest plays in guiding socialization, it is important that we better understand when infants begin to recognize expressions of interest and how they respond as a result.

7.1.1 Infants' responses to expressions of interest

Perhaps the best method of determining whether infants recognise a particular emotional expression in a third-party is to observe how they respond to that expression (Walle & Campos, 2012). Infants have previously been shown to be sensitive to adult expressions of interest, regulating their behaviour as a consequence. For example, 12-month old infants' reactions were measured in a classic experimental paradigm used to test whether infants used

the facial expression of a third party to regulate their behaviour (Sorce et al., 1985). In this social referencing paradigm, while the infants didn't cross a visual cliff at all when their mother looked fearful, 14 out of 19 of them crossed when she looked happy, 11 out of 15 when she expressed interest and only 2 out of 18 when she expressed anger. This experiment demonstrates that third-party expressions of interest can regulate behaviour in infants.

Meanwhile, Egyed, Kiràly and Gergely (2013) have demonstrated that 18-month old infants are not only sensitive to adult expressions of joy/interest, but that they are also sensitive to how those expressions are presented to them. Gergely and Csibra have argued that both adults and infants are naturally equipped with communication tools for the transmission of information from the adult teacher to the infant learner (see for example Gergely, Egyed & Kiràly, 2007). In what they describe as 'natural pedagogy', the adult teacher will use 'motherese' and 'motionese' to adapt their speech and gestures when teaching something to the child, while the child herself becomes particularly attentive when these conditions for learning are present. Gergely and Csibra argue that by communicating *ostensively* (Sperber and Wilson, 1986; 1995) through such means, the teacher is communicating not only the content of the message (for example, how to use a spoon), but also the very fact that there is a message being communicated (for example, "I am now teaching you something"). According to empirical research on natural pedagogy, children from as early as 14-months old (Gergely, Egyed & Kiràly, 2007) learn from ostensively communicative interactions that this is how they should feel about an object.

In Egyed, Kiràly and Gergely (2013) then, the infants witnessed an experimenter looking at one object with joy/interest and another object with dislike/disgust. In the first condition, the first experimenter ostensively communicated how they felt about the object to the participant (by saying the participant's name, by smiling and greeting the baby) before looking at the objects with the relevant expressions. The first experimenter then left the room before a second experimenter entered. This second experimenter asked the infant to choose one of the two objects to give to her. In the second and third conditions, the first experimenter expressed

how she felt about the objects without engaging with the child at all (i.e. non-ostensively). The difference between these second and third conditions was that in the second, it was the second experimenter who asked the child for one of the objects, whereas in the third condition, the first experimenter herself asked the child to give her one of the objects. The results showed that the infants chose to give the 'interesting' object to the second experimenter significantly less often when the object had been presented to them non-ostensively than in the other two conditions. The authors argued that this demonstrated that children understood when an object was presented to them ostensively it is in order to communicate something generalizable about the nature of the object – its social value. However, when an object was presented to them inostensively, or, in other terms, when they observed the third-party's expressive reaction without the third-party acknowledging them, this was a sign that the person found the object interesting for themselves, and that as such, the affective value was not to be generalized to others.

Both of these studies then (Sorce et al., 1985; Egyed, Kiràly & Gergely, 2013) demonstrate that children are sensitive to expressions of interest in third parties. The social-referencing paradigm highlights the fact that 12 - month olds may regulate their behaviour (moving across an apparent cliff) in response to the interested expression of a third-party, while the more recent object-choice study demonstrates that 18 - month old infants can understand third-party preferences for objects when the third party expresses interest/joy (versus disgust/dislike). Taking into account these two results, it is possible to imagine that children as young as 12-months old could choose an object for themselves on the basis of expressions of interest versus disinterest in a third-party. Choosing an object for oneself is presumably less cognitively demanding than associating a third-party's expression with how that third-party feels. If it can be demonstrated that infants as young as 12 months can choose objects for themselves on the basis of third-party expressions, it would provide evidence that they can learn

about the significance that objects in their environment have for other people through distinguishing between expressions of interest and disinterest.

7.1.2 Present study

In this study, we measure younger infants' choice behaviour as a reaction to expressions of interest and disinterest in a simple choice paradigm. It could be that in such contexts infants experience a kind of emotional contagion: in other words, the adult's expression of interest towards an object induces interest behaviour in the child, particularly when compared to a negative expression. As mentioned earlier, infants aged 12 months olds have previously been shown to be sensitive to expressions of interest (Sorce et al., 1985). Furthermore, Tomasello has demonstrated that children are capable of joint attention at 12 months (Tomasello, 2003). We hypothesize then that from 12 months old, the participants will choose an object that has been looked at with interest more frequently than one that has been looked at with disinterest.

Stated explicitly, we hypothesize that the 9-month old children will be insensitive to the expressions of interest and disinterest, resulting in them choosing the objects at chance level. Moreover, we hypothesize that the 12-month olds will choose significantly more than chance an object that has been looked at with interest rather than one that has previously been looked at with disinterest. Finally, we expect this behaviour to be confirmed by 15 months, which would be demonstrated by the 15-month olds also choosing the object previously looked at with interest significantly more often than the object looked at with disinterest. Indeed, we would expect this effect to be even stronger at 15-months than at 12-months old.

Underpinning these hypotheses is the assumption that infants aged 12 and 15 months receive and use the affective information provided by the emotional expressions in identical fashion – that is, that both groups use the expressions as signals of the value that they should attach to those objects. In other words, a third-party's expression of interest toward an object

denotes an object that is worthy of further investigation, while an expression of disinterest denotes an object to be ignored or even avoided. Thus, the affective transfer would be a sort of 'contagion'. However, if, as the theory of natural pedagogy suggests, infants aged 15 months are sensitive to whether affect is communicated ostensively or not as described in natural pedagogy theory, the fact that the expressions are communicated inostensively could mean that these infants would recognise that these expressions belonged to the experimenter alone and were not necessarily to be generalised to others, or indeed learned. Presumably this would weaken the 'contagion' link between what is expressed by the third-party and what the infant experiences. If this link was broken entirely, this would result in 'at chance level' choices of the object. With this possibility in mind, an alternative hypothesis would be that while 12-month old infants choose the object that has been previously looked at with interest significantly more than chance, 15-month old infants would not.

7.2 Method

7.2.1 Participants:

Twenty-three 9-month olds (10 female, Mean average age= 9 months and 9 days, s.d.=14days, range: 8 months, 8 days to 9 months, 29 days), twenty-three 12-month olds (12 female, Mean average age= 12 months 5 days, s.d=16 days, range: 11 months 5days to 12 months and 27 days) and twenty-one 15-month olds (14 female, Mean average age= 15 months, 4 days, s.d.=15days, range: 14 months, 8 days to 15 months, 24 days) participated in the current study. All infants were full-term. Participants were recruited from local urban populations. A further 17 children (5 9-month olds, 7-12 month olds and 5 15-month olds) were excluded from further analysis due to the fact that they made no choice between the objects (5), because they

chose both objects simultaneously (5) or because the experimenter was later adjudged to have spent more time looking at one object rather than the other (7) by naïve evaluators.

7.2.2 Procedure:

The participants sat on their parent's lap on a chair with little wheels on it. They sat about 50 cm from a table. There was a tray on the table. Experimenter 1 (DD) engaged the participant for a brief period of play with one object to demonstrate that the participant could take the object from the moving tray when it was pushed towards them. This was also performed in order to avoid startling the participant when they saw the tray move forward for the first time. This period lasted until the experimenter was satisfied that the participant was prepared to touch the object placed on the tray (normally less than 30 seconds).

Experimenter 1 then disengaged in communicating directly with the participant and her mother, returned to the opposite side of the table and tray and, after a few seconds pause, placed two very similar but non-identical objects (children's thick jigsaw puzzle pieces) on the tray, out of reach the participant. Experimenter 1 then moved to a corner of the room and sat down at a table with his back to the mother and child.

Figure 7.1: Photograph of Expressions

Photographs taken from recordings of experimenter expressing interest (left) and disinterest (right).

Experimenter 2 (NF) entered the room and placed herself on the far side of the table from the participant. She picked up the first object with her right hand on the right side of the tray and looked at it with interest for 5 seconds before replacing it. She then picked up the other object on the left side with her left hand and looked at it with disinterest for 5 seconds before replacing it. She then pushed the tray forward towards the participant and left the room. This was the cue for the parent to move forward on the chair in order to let the participant chose one of the objects. The choice was coded '1' if the object that had been looked at with interest was touched first, and '0' if the participant had touched the object that had been looked at with disinterest first.

At no time did Experimenter 2 either look at the child, vocalize or in any way try and attract the child's attention – the experiment was carried out inostensively. Examples of the expressions from the participants' view can be seen in Figure 7.1 above.

7.3 Results

At 9 months (N=23), the participants chose randomly – they appeared to be insensitive to the experimenter's non-ostensive expression of interest. As expected, a binomial test indicated that the proportion of 12-month old participants (N=23) who chose the interesting object (17/23 = .74) was significantly greater than chance (0.5), p=.035. However, the 15 month old participants (N=21) chose the *disinteresting* object more often: a binomial test indicated that the proportion of 15 month old participants who chose the disinteresting object (17/21=.81) was significantly greater than chance (0.5), p=.007 (see Figure 7.2 below).

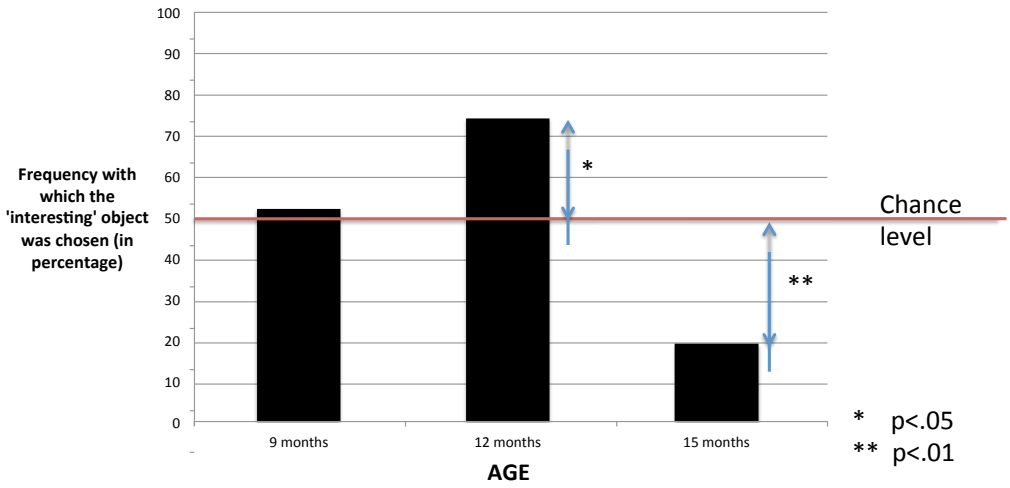

Figure 7.2: Object choice by age

The results of the experiment are shown by age at 9 months (N=23), 12 months (23) and 15 months (21). Chance level is 50% as the choice was between two objects.

7.4 Discussion

This study set out to measure infant reactions to adult expressions of interest in an object choice paradigm. As expected, when presented with two objects that had previously been looked at with interest and disinterest, the 9-month old participants chose the objects randomly and appeared to be insensitive to the expressions. Furthermore, and also in line with expectations, the 12-month old participants chose the 'interesting' object significantly more than chance. However, the 15-month old participants reacted differently to expectations, not only not choosing the object of interest, but actually choosing the object significantly more that had previously been looked at with disinterest.

Of note, the conditions under which the child saw the experimenter look at the objects were as inostensive as possible: Not only did the experimenter not look at the child at any moment throughout the experiment, but the experimenter made no vocal expression either, and the intensity of the expressions of interest and disinterest were not exaggerated, but were kept as natural as possible. Therefore, we feel that it is correct to say that the participants were able

to react to naturalistic expressions, even though every effort was made on the part of the experimenter to make the same two expressions every time.

Clearly, the 15-month infants' behaviour was unexpected. Why would it be that the 15-month old participants not choose the object that had been looked at with interest? The first step to interpreting these results is perhaps to look again at the expressions that were made. Secondly, three possible alternative explanations will be provided and will be presented in terms of the cognitive demands made of the infants, from easiest to most difficult.

In designing this study, we elected to look at both the interesting and disinteresting objects for the same length of time in order to avoid the participants choosing the object simply as a function of the time that the experimenter spent looking at the objects. We assumed that if the experimenter looked longer at one object than another, this would provoke the participants to choose that object more often (Bayliss et al., 2006), irrespective of the facial expression. However, this resulted in the expression of disinterest being displayed for the same duration as the expression of interest. This is not very natural, except perhaps in cases of morbid interest where, for example, people slow down on the highway to look at a car accident. Indeed, there could be something inherently interesting about an expression of disinterest. If expressions of disinterest were tested alone rather than paired with interest, it may well be the case that people's expressions of disinterest excite curiosity. This appeared to be the case when a control test was carried out on the expressions. While the infant participants here had clearly seen, in vivo, one emotional expression (e.g. interest) in the context of the other (e.g. disinterest), in the control test, adult participants were each asked to identify one emotional expression from a list of 9 options (anger, disinterest, disgust, fear, happiness, interest, sadness, surprise and 'another emotion'). Whether or not what we had intended to be expressions of 'interest' or 'disinterest' were displayed, the participants most frequently identified the expression as being 'interest'. It remains to be seen whether the adult participants would identify our 'disinterest' stimuli as disinterest if it were placed in the context of the interest expression.

More globally, this raises the question of whether all affective expression of a third party could elicit curiosity: if someone is looking into a container with interest, disinterest, disgust, fear, anger or any other emotion, this may provoke a desire on the part of the onlooker to look into the container themselves. Perhaps then, it is the level of arousal that provokes curiosity, rather than the valence or particular emotion. However, and with regard to the present study, interest and disinterest were coupled, so the relevant question is why the 15-month olds choose the disinteresting object *rather than* the interesting object.

The first explanation, and the least cognitively demanding, is that the older participants reacted to the fact that the experimenter looks at the disinteresting object for the same length of time as she looks at the interesting object. Therefore, it could be that the participants were made more curious by the behaviour of the experimenter as she looks longer at an object that she finds disinteresting. This explanation could be tested by manipulating the duration of the expressions towards the objects.

A second explanation is that the 15-month olds find expressions of disinterest more interesting (thereby eliciting more investigative behaviour) than expressions of interest. But this is not as simple as it seems: it suggests that while the 12-month olds' affective judgement is based on a type of contagion, reacting with interest to interest, a 15-month old may be able to take a more 'meta-stance', as if to take a cognitive step-back. However, this still wouldn't explain why, at 15-months old, infants would be more motivated to choose and investigate the 'disinteresting' object more often than the 'interesting' object. One possible reason might be found in the fact that 15-month olds have been exposed to more negative emotion since they have been self-mobile for longer, and their parents tell them to "stop going there", or to "stop doing that". They may well have learned that (vocal or gestural) expressions of negative emotion on the part of an adult may hide the fact that there is something worth investigating for an infant (wires behind a television, scissors...). This explanation seems plausible in light of the fact that 15-month olds are known to be contrarian.

A third explanation is that the 15-month olds recognise expressions of interest as signals of possession: given that the experimenter shows interest for one object (and, by association, that it *belongs to them*), the participants takes the other object, simply because it is the only 'remaining' object. This would mean that the fact that the child choose the 'disinteresting' object, has less to do with the fact that it was looked at with disinterest, but rather that it was the 'other' object in comparison to the one 'owned' by the adult. However, this seems to be asking even more, cognitively speaking, of the child, than the first two explanations. This explanation could be tested by the experimenter looking at a collection of objects with interest and disinterest rather than two individual objects, thus allowing the infant to choose one of the objects looked at with interest and not *the* object. If this explanation were correct, the 15-month olds would be expected to choose from the objects that had been looked at with interest.

In any case, all three of these explanations suggest a de-coupling of infants' affect at 15-months old from the third-party adult, and support the findings reported earlier that children may learn general rules about what is significant in the environment from observation alone until the age of 14 months, but that afterwards, what they 'ought to' feel about things must be taught to them more explicitly (Gergely, Egyed & Kiràly, 2007). While this doesn't explain why the 15-month old should choose an object that had previously had a non-ostensively communicated expression of disinterest more inviting than a similarly-communicated expression of interest, it would suggest that the 15-month old is less bound than the 12-month old to choose the 'interesting' object. Furthermore, irrespective of why the 15-month olds choose disinterest over interest, the natural pedagogy explanation leads to the prediction that if the interest – disinterest expressions were to be presented to 15-month old infants ostensively, that they would choose the object previously looked at with interest, rather than disinterest.

This study provides important results with a view to understanding how infants regulate their behaviour when presented with expressions of interest, and how such reactions

facilitate affective social learning in terms of the value others attach to objects in the shared environment. It may also lead to a better understanding of the age at which contagion can become cognition, as children begin to reason about the affective evidence in their environment rather than accepting it at face-value. Alternatively, it may lead to better recognition of the precursors to the acquisition of the concept of possession. Finally, it may lead to a greater appreciation of how children process affective value and whether or not they can generalize from inostensive communication. Thus, while this study provides evidence that children can learn about the significance that objects in their environment have for other people through distinguishing between expressions of interest and disinterest, it suggests that such significance may have to be taught ostensively from the infant's second year.

XXXXX

The end of this chapter marks the end of the body of the thesis. The concluding chapter will endeavour to bring the threads of the preceding chapters together and, after answering directly the four questions set out in the introduction to this thesis, I will tentatively point out areas for future research and the direction that that research might go.

Of particular interest is the identification from sociology of universal social forms that may structure how we identify social relations and infer emotion (or how we might infer the universal social forms from the emotions), and clarification of the conceptual space that I would like emotion appreciation to inhabit.

XXXXX

CHAPTER 8

CONCLUSION

This thesis is fundamentally about recognising emotions in others and the inferences that can be drawn on the basis of their recognition. As a result of the theoretical investigations and empirical work presented here, a novel approach to emotion recognition is beginning to emerge. This approach, named *emotion appreciation*, is more holistic than traditional approaches, focusing, as it does, on the entire person-object-context, rather than on one particular aspect of emotional expression. We explicitly equate expressions of emotion with expressions of *value*: Recognising an expression of emotion then, is recognising the evaluation that the person has made of a particular object in the particular context; it is appreciating the person-object-context relation.

Having identified 'affective observation' as a mechanism of 'affective social learning', we described how an emotion appreciation approach could be used to learn from the person-object-context. For example, by using this approach, it is possible to differentiate between disgust and sadness even when the facial expression is the same (Aviezer et al., 2008), between a smile that expresses success or resignation (see *equifinality*, Campos, Dahl & He, 2010) and to recognise frustration in action persistence (Premack & Premack, 1994). It has been argued that a prediction is the outcome of an inference (Mercier & Sperber, 2009). As such, we can infer how others relate to an object given the circumstances and predict how they are likely to act (next) toward that object, without them being aware of our presence. Furthermore, it may be possible to infer which one of two people has the more powerful negotiating position (van Kleef & Coté, 2007; see below for discussion of dominance perception in children and animals) and if the situation is one of competition or cooperation (Van Doorn, Heerdink & Van Kleef, 2012). It has been argued that it would be more difficult to make such inferences using the orthodox method of face recognition. In short, emotion appreciation allows us to *learn from others* more easily. This thesis also extends emotion research into areas of social cognition that until now, have appeared to under-acknowledge the presence of emotional processes. Finally, through the

emotion of interest, it has been shown how adopting such an approach can be used to criticise narrower views of how emotions are constituted and identified.

To reiterate, this approach has emerged post-hoc; it was not the focus of the work presented in the chapters, so consequently, the chapters are not definitive tests of the approach. Instead, it is hoped that the chapters and the following discussion are indicative of an approach that may prove useful beyond the scope of this thesis. In this conclusion, I will focus primarily on evaluating the success of the emotion appreciation approach in answering the four principal questions that arose during the introduction, before making suggestions about how this work could be extended in the future.

8.1. Responses to the target questions

I will now address the four questions that I posed at the end of the introduction to this thesis:

1. What role could emotion appreciation play in learning the value of objects from others? (chapters 2-4)
2. How could emotion appreciation enable us to learn about others' mental states and their likely action? (chapters 2-5)
3. Can an emotion appreciation approach inform the discussion about interest's categorisation as an emotion? (chapter 6)
4. Can an emotion appreciation approach inform us about the age at which infants regulate their behaviour as a function of third-party expressions of interest? (chapter 7)

8.1.1. What role could emotion appreciation play in learning the value of objects from others?

When walking down a busy street, what is it that catches your eye? What is it that you find interesting? Why that particular object? Could it be that it is, at least in part, the result of your education, from your parents, your peer group and school? Of course, there are certain phenomena that are likely to elicit emotion in everyone at all times (see the discussion on collative variables, below), and there are others that are dependent on biological state, taste and circumstance – popcorn at the movies, or a cold beer at the end of a hard day of physical labour, for example. But it seems that there are some values/emotions that are taught – a Christian child is taught to cherish a crucifix, while a vampire may be taught to fear one, a child might be taught to love Manchester United Football Club, another to loathe it. Chapters 2 - 4 set out to identify and structure the mechanisms involved in this affective social learning process.

Social learning (Bandura, 1977) itself has become closely associated with research in comparative psychology (for reviews, see Galef & Laland, 2005; Hoppitt & Laland, 2008) and is comprised of learning how to use tools and other objects through imitation, emulation and mimicking. Comparisons have been made with how children and non-human primates learn and, it has been argued, different levels of understanding are achieved depending on the type of observation carried out (Want & Harris, 2002). But, as pointed out in chapters 2-4, when trying to learn from others, it is presumably just as important to understand what value the others give to an object, as to understand what they are doing with it: a positive expression towards the object is likely to be a clear sign of worthiness, while a negative expression may be an indication that the object is useless or frustrating (although see chapter 7 for a counter-intuitive result with 15-month-olds). Newcomers to any environment do not need just to learn from the indigenous population about how to use the objects in their new environment, they also need to learn about the value of those objects: How important is the handshake? Is it acceptable to talk

about politics? Which football team is the best supported in the area? etc.. One newcomer (or infant) for example, may learn the value from a local resident (or parent), and the process may continue, involving families, groups and newcomers. We argue that a culture can be transmitted and perpetuated in this way (chapter 2).

As affective social learning provides a structure for processes concerned with learning from the expression of others, emotion appreciation describes the method that can be used across those processes (with the possible exception of contagion) to recognise the person-object-context most successfully. Importantly, the use of the emotion appreciation approach has opened up areas of social cognition to emotion research that would not have been opened up by the use of a more orthodox approach to emotion recognition.

8.1.2. How could emotion appreciation enable us to learn about others' mental states and their likely action?

In chapter 5, focus turned to the application of emotion appreciation as a method of recognising emotion in affective social learning and beyond. Social cognition has recently been defined as the study of how people make sense of other people and themselves – information that can be obtained *about the 'social'* (Fiske & Taylor, 2013), or alternatively, as the study of how we process the information that can be gathered from others – information that can be obtained *from the 'social'* (Clément, 2016)[23]. But immediately, whether social cognition includes what can be learned 'about' others or what can be learned 'from' others, the link with affect should become apparent: is it not the case that we use others' affective states whether to 'make sense' of them personally, in terms of their dispositions, beliefs and actions (Gilbert, 1988) or indeed, to gauge the strength and veracity of the information they provide (Harris, 2012)?

[23] Clément (2016) describes a third meaning of social cognition that relates to 'group reasoning', but it will not be discussed here.

We highlighted the connection between social cognition and affect and demonstrate that the link is particularly tangible when an emotion appreciation approach is adopted (compared to a basic emotion or standard componential appraisal approach). Focusing on the developmental literature and in particular on research on how infants appreciate others' goal-directed actions, pro-social responding and false-belief understanding, we argued that incorporating measurements of affective processes into studies of social cognition could serve as an explicit acknowledgment of the link between the two fields of research, while enriching both. We re-analysed the results of classic and contemporary developmental experiments in affective observation situations, demonstrating the utility of adopting an emotion appreciation approach (called *emotion understanding* throughout the chapter) and different interpretations of the results were offered using this approach. These interpretations are currently being empirically tested in collaboration with Prof Walle and his team.

Based on their appreciation of the relations that the individual has with the objects in their environment, the observer can learn what the others are doing, why they are doing it and predict what they are likely to do next. As a consequence, the observer can make decisions about how to (re)act. Again, these possibilities seem more difficult to imagine if an orthodox approach were used.

8.1.3. Can an emotion appreciation approach inform the discussion about interest's categorisation as an emotion?

Interest seems to have been excluded from Ekman's list of emotions on the basis that there was no universally recognisable facial expression of interest. We used an emotion appreciation approach to test how well expressions of interest could be recognised in comparison to the average of the classic six Ekman emotions in four different presentation conditions: static face, dynamic face, static whole-body, dynamic whole-body. As the results from chapter 6 showed, when the context is provided by the actors looking off-screen in the

static head condition, the expressions were barely recognised better than by chance and significantly less well than the averaged result of the comparison emotions. Furthermore, even when the facial expressions were presented dynamically, the recognition rates were significantly lower than the average of the comparison emotions, even if they were significantly better recognised than in the static face condition. Indeed, only when the emotion of interest was expressed posturally did the participants recognise it as well as the average of the emotion in the comparison group.

In retrospect, it may have been worthwhile to also test expressions of interest that were taken with the actors looking straight at the camera, in order to compare the two styles of paradigm more directly. On the other hand, the results suggest that, in line with previous research (Mortillaro, Mehu & Scherer, 2011; Reeve, 1993; Reeve & Nix, 1997), whether static or dynamic, an emotion appreciation approach will not reveal a prototypical facial expression of interest. Nevertheless, it appears that the most salient part of interest's expression can be found in the posture or body of someone who is interested.

It may be that those basic emotion theorists who themselves employ bodily expressions and postures as part of their expressions (e.g. Jessica Tracy) could accept these results as an indication that a prototypical expression of interest exists, even if more research would be needed to test these expressions cross-culturally. If their greatest barrier to conceive of interest as a basic emotion is based on the fact that there is no prototypical expression of interest, an emotion appreciation approach may help convince them.

We have argued that, in general, emotions may have several associated action tendencies (see equipotentiality: Campos, Frankel & Camras, 2004; Campos, Dahl & He, 2010). For example, someone running away, frozen on the ground, or fighting, may be exhibiting fear. When someone acts with interest, they explore, try to find out more (Lauria et al., in prep.; in review; see also Silvia, 2006). In short, they act with curiosity. It may be that someone displaying interest does so only through showing curiosity. In other words, there is only one

action tendency for interest. While curiosity can be expressed in many ways (a change of attention, sustained attention, a turned head, approach...), all of them signal the same type of behaviour and are aimed at appreciating the object more closely. Presumably, anyone observing these behaviours would infer that the person was interested. This may make interest a particularly good emotion to study posturally or corporally, and in future studies in emotion appreciation.

8.1.4. Can an emotion appreciation approach inform us about the age at which infants regulate their behaviour as a function of third-party expressions of interest?

In chapter 7, children were presented with adults looking at one object with interest and another with disinterest. Every attempt was made to ensure a non-ostensive procedure: the experimenter neither acknowledged the child on entering the room, nor during the experiment. It can be said that the experiment was also carried out in an affective observation context.

While it was expected that the 12 and 15-month-old infants would be sensitive to the expression of interest, it was not expected that the 15-month-old infants would express their sensitivity by choosing the other ('disinteresting') object and hypothetical explanations are provided in the chapter.

With hindsight it would have been better to include a measure of sustained interest, such as leaving the infants time to play with the objects, once their choice had been made. This would have provided a continuous measure of interest. Indeed, we are currently in the process of replicating this study and have included such a measure. Furthermore, in the replication, we have also included an ostensive condition in which the experimenters acknowledge and call the infant by name. It is predicted that children will be more sensitive to the expression in the ostensive condition and, as such, the 9-month-old infants may show a tendency to choose the interesting object too.

8.2. Evaluation of emotion appreciation

This thesis has described the emergence of a novel approach to emotion recognition from our theoretical and empirical work. The chapters, it is argued, are imperfect tests of this approach. In this section, the approach will be more formally evaluated, as its strengths and limitations are described, before a concluding section will describe ways to extend the approach. We begin by outlining certain theoretical implications of adopting such an approach.

8.2.1. Implications

This thesis focuses on the relation between the person and the object in context. In fact, it could be argued that social appraisal (Manstead and Fischer, 2001) implicitly involves an emotion appreciation approach. As we stand in front of an object, uncertain how to evaluate it in terms of how to *relate to* it, seeing other people's evaluations of the object can influence us. While this object could be a painting in an art gallery, it could also be a new idea that we hear in class, as we watch our classmates' reaction, or it could be about deciding with friends whether a particular play on the football field was a remarkable piece of skill, or whether it was just lucky. On each of these 'social appraisal' occasions, we do not simply take into account the facial expression of the reactions, but perhaps the cheers and the silences, the team affiliation of each friend, or perhaps even how well dressed the unfamiliar art critic is (see Mumenthaler, Rossi and Sander (in review) for a study on emotion recognition and clothes). With this approach, context can also include what the observer has previously heard about the person's goals and behaviour. For example, if the observer knows that an acquaintance is prone to bouts of depression, this may colour their appraisal of certain aspects of the acquaintance's behaviour. Or if an observer has heard that someone is facing a deadline to get to work, this could be informative about how that someone feels when she looks at her watch.

While it has been shown that the immediate surroundings may play a vital part in identifying the emotion and inferring the correct meaning as a consequence (Aviezer et al., 2008; Aviezer, Trope & Todorov, 2012), it has also briefly been argued that the culture (Elfenbein & Ambady, 2002) and social relationship (Van Kleef, De Dreu & Manstead, 2004b) can play vital roles in the appreciation of the relation that someone has with an object. One of the outstanding issues is the extent to which culture and context can influence emotion recognition.

Indeed, for a thesis aimed at highlighting the relational and contextual aspects of emotion recognition, it is perhaps surprising to the reader that so little has been said about cross-cultural studies. While it is of great importance to assess how emotions are differentiated and how meaning is inferred within a particular culture, it is unclear how easy it is to measure and compare *meaning* across cultures, particularly as the emotions will be expressed and identified differently (Campos et al., 1994). What an expression means and what it could pertain to may be culturally specific, even if its cause is universal (see section 1.1.2). To argue that a particular expression is appreciated in the same way across cultures is to say that it is universal, and while it is probably the case that a certain number of emotional facial expressions can be recognised universally (Ekman & Cordaro, 2011), the problems with this idea, in basic emotion terms, have been discussed at length in the introduction to this thesis. In any case, as has been argued elsewhere, most cultural research uses culture as "shorthand for a grouping variable of secondary interest", when the primary interest concerns perception, cognition or emotion, for example (Adams & Markus, 2004, p.336). However, culture obviously remains an important topic for emotion recognition (see discussion below).

As far as universality is concerned, an emotion appreciation approach predicts that there are many more than six basic person-object relations that can be identified and 'understood' within each culture. While there are a certain number of universal human predicaments, and the number of reactions to those predicaments is greater than the number of predicaments

themselves (according to the concept of equifinality), those reactions can presumably be appreciated in a given context: Whether a person is preparing to fight their corner, is petrified, or is running away, the context should make it clear that they are scared. Thus, while emotions can be recognised universally, as a function of the universal human predicaments and the limited (although varied) reactions that can be made to them within each culture, it is unclear how well the person-object-context relation could be appreciated across cultures. In other words, an emotional reaction to 'loss' is universally one of 'sadness', but what exactly constitutes a loss and how it is expressed may differ culturally, and 'joy at the misfortune of others' is universally 'schadenfreude' whether or not my culture has a concept or word for it.

It therefore seems to be a logical consequence of the approach that the number of person-object-context relations that an observer can identify is guided by their cultural sensitivities and constrained by the number of emotion-words in their lexicon. It may be helpful to imagine these words in clusters or families and each 'universal human predicament' as the core characteristic of each family[24]. For example, emotion-words that relate to loss, could all be members of the sadness family (e.g. melancholy, distress, despair, morbidity, regret), emotion-words that relate to danger could be members of the fear family (e.g. alarm, anxiety, horror, trepidation) and, as proposed in work we have carried out elsewhere (Lauria et al., in prep), emotion-words related to informativeness could all be members of the interest family (engross, fascinate, engage, intrigue). The idea of emotion-families is clearly not a new idea, and as pointed out in chapter 6, was actually employed by Ekman and Friesen (1975; 1978) in describing a family of anger expressions. But it makes particular sense here given that the approach focuses on the viewpoint of the observer and the fine-grained detail of how to respond to all of these 'family-members'. Furthermore, while both Izard and Ekman have limited the number of emotion families based on physiological measures (including facial expression), an emotion appreciation approach does not.

[24] In philosophy, it is acknowledged that there is not a formal object for each distinguishable emotion (Teroni, 2007).

Fernandez-Dols and Crivelli recently pointed out that the idea of a 'true' expression of emotion came to be defined as one that should be automatic and could be asocial: a universal expression was neither learned nor used as a social signal. The authors argue that this "definition of universal expression as an asocial readout that can be elicited by extremely artificial stimuli" is "probably throwing the baby out with the bath water", in the sense that for anything to be described as universal, it should be robust in cross-functional and cross-cultural situations (Fernandez-Dols & Crivelli, 2015, p. 27).

As has been argued earlier, there are a number of reasons to assume that there is nothing like a one-to-one relationship between how people are feeling and an automatic, stereotypical facial expression (section 1.1.3) in either natural (e.g. Scherer & Ceschi, 2000; Crivelli, Carrera & Fernandez-Dols, 2015; Fernandez-Dols & Crivelli, 2013) or laboratory settings (e.g. Reisenzein, Studtmann & Horstmann, 2013). The authors point out that, even in the counterfactual situation whereby laboratory testing revealed a consistent pattern of expression, "such findings would not test whether emotion causes the facial expression or how often the two occur in nature" (p28). Allied to the criticisms I highlighted earlier about the production of stimuli by students for students (in section 1.1.3) and in the knowledge that the stimuli are intentionally created to be as easy to recognize as possible, it is hardly surprising that those expressions are very well recognized, in spite of the fact that it is not clear how closely related they are to everyday experiences of emotion in any culture, let alone any claim to universality.

Fernandez-Dols and Crivelli offer a new interpretation of universality. Returning to the idea of the sender experience in Frijda and Tscherkassof (1997), they argue that emotion recognition is "a semiotic task in which the receiver connects 'emotions as signs' (artificial icons of emotions such as prototypical facial expressions) with emotions as 'cognitive representations' (language-dependent concepts of emotion)" (Fernandez-Dols and Crivelli, 2015, p. 35). They draw parallels between the capacities to recognize emotion and of counting: they point out that while there appears to be a universal innate representation to quantify (one, two, many), when

combined with other cognitive competencies gained through explicit socialization, the number manipulation can become much more elaborate. In emotion recognition then, for them, there might be basic, innate capacities to recognize core-effect (such as Russell's core-effect – pleasure v displeasure) that are built on, through socialization, to construct a more nuanced categorization process of emotional events as particular emotion-words and expressions.

In fact, this conceptualization is not necessarily incompatible with the account of universality that I propose here, since it is arguing for universality of the recognition of expression on the face of the emoter (although their account could presumably be easily extended to postural, gestural or vocal expression), whereas I argue for a universality of the recognition of the relation(s). Their argument is at a different conceptual level to mine. While is not clear from their research whether they argue that we learn to recognize relations that actually exist in the environment (as I argue here), or whether we learn to recognize certain emotional expressions based on specific cultural events, I have so far said little about the mechanics involved (as they do), although emotion appreciation is described below in terms of inferential process (section 8.2.4). Indeed, both their conceptualization of universality and mine could be described as naturalistic – theirs, in the sense that they postulate some innate capacity to process other people's pleasure vs displeasure, and mine in the sense that I implicitly postulate an innate capacity to process other people's relation with the other objects in their environment. But the difference can be found in the fact that their account is profoundly verbal (i.e. language dependent), whereas mine needs no words at all; while it may be the case in emotion appreciation that the affective relation is categorized (in words), it certainly does not need to be the case.

How many emotions are there? Ekman chose to use three non-English words in a recent explanation of his theory (Ekman & Cordaro, 2011): *Naches*, *Fiero* and *Schadenfreude*[25]. Does this

[25]Ekman and Cordaro (2011, p.365) define Naches as "a Yiddish word for the feeling a parent/caregiver, or teacher, feels when witnessing the achievement of their offspring", Fiero as "an Italian term for the emotion felt when

give reason to believe that these emotions exist universally, but that the English language has not developed its own words to capture accurately the relationship they describe? Presumably yes, and if so, it may be possible that there are person-object-environment relations that exist outside of *any* language. One explanation then would be that there are an infinite number of emotions, but that since languages are imbedded in cultures, they only ever have words to capture a subset of those emotions. An alternative would be that there is no such thing as emotions outside of language at all (e.g. Barrett, 2014). An emotion appreciation approach suggests that there are at least as many person-object-context relations as there are possible ways to describe them. While it is certainly possible to describe a certain range of these relations as "pride", perhaps a more nuanced observer might describe the same relation as "satisfaction", "delight" or even "*naches*". A certain relation exists in reality – sadness is provoked by loss, fear by danger etc. - and is described according to the observer's language: culture, mental health, personality and so on. To sum up, the number of emotions that a person can name is, in the first instance, guided and constrained by the number of person-object-context relations that exist, and, in the second instance, by the number of words in their lexicon. It is impossible at this moment to estimate how many person-object-context relations exist, partly because I am constrained by my own culture and lexicon, but also by the boundaries of this thesis and time. However, this subject may well be worth returning to in future research.

With regard to coherence, it has been said that: "Emotions are not measurable by *coherence* of quite specific behaviours (e.g. heart rate, facial expression, amygdalar activation, etc.), but rather by *orchestration* of behaviours serving the same purpose (with first one behaviour, then another, then both, and sometimes neither coming into play)", (Campos, Dahl & He, 2010, p.102. *italics in original*). This appeals to me: an emotion appreciation approach would predict that it would indeed be very difficult to find coherence for one particular emotion. As

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meeting a difficult challenge. It may occur during a competition with others, or when alone, a difficult task is confronted and measured," and Schadenfreude as "the German term for the emotion felt when you learn an enemy has lost or suffered".

pointed out earlier, just as there can be many reasons for a particular facial expression (or its components) and action tendency, there can be a number of physiological reactions for each emotion family. While there are examples of physiological experiments across discrete emotions, none could be found within one emotion family, presumably because this would be too fine-grained for such measures. But it is not impossible that, in the fear family, for example, the heart may slow down in dread, but speed up in terror, at least at levels that are greater than chance. Although new research offers hope that response coherence exists when measured more carefully (Evers et al., 2014), given how unique each experience of emotion can be (intrapersonally and interpersonally), it is difficult, according to this approach, to imagine occasions when cases of 'strong' intrapersonal coherence of emotion will ever be found. In fact, interestingly, an emotion appreciation approach would predict that coherence is most likely to be found in an observer across different experiences of the same situation. For example, within different experiences of loss in third parties, it is possible that a coherent range of physical and physiological tendencies would be revealed for sadness in a single observer of those experiences in third parties. When compared to different experiences of watching someone being 'intentionally obstructed by a third party', a different, but nonetheless coherent, range of physical and physiological tendencies would be revealed for anger. It would be interesting to test this empirically while employing the analysis in Evers et al., (2014).

From the constructionist perspective on universality and coherence, Barrett and Russell have argued that emotions are conceptual and as such are constructed in language rather than triggered (e.g. Barrett & Russell, 2014). This would mean that human infants and animals could not experience and perceive emotions. But in the emotion appreciation account, as long as it can be shown that the dog experiences the relevant ' universal predicament', this would be sufficient proof that the dog can experience the associated emotion. While there is certain doubt in the literature about whether non-verbal children and non-human animals can experience emotions because they don't have language (Barrett, 2006a), given that this approach is inferential, it

means that if a dog looks angry and appears to have good reason to be angry, then it is an angry dog, whether or not the dog can express her feelings verbally. A final consequence of this approach, then, is to bestow children and non-human animals with emotional behaviour.

8.2.2. Advantages

Given that this thesis has focused on demonstrating the benefits of adopting an emotion appreciation approach, this section will inevitably include some repetition. The passages that refer to earlier arguments shall be kept as succinct as possible.

Firstly, the emotion appreciation approach challenges the orthodox method of treating emotion recognition. While, as evidenced by the research described in this introduction, this orthodox approach has come under heavy and sustained criticism, it continues to enjoy great support and to be highly influential. At the very least, an emotion appreciation approach adds to the call for a 'social' re-focusing of research in affective science – a call that has been explicitly made before (Fischer & van Kleef, 2010; Manstead & Fischer, 2001; Parkinson & Manstead, 2015).

Secondly, and as argued throughout this thesis, adopting a less restrictive, context-inclusive approach could potentially open up new areas to affective research. New focus, too, may be given to questions about emotional development as we go beyond questions about the age at which babies recognise happy or sad faces, but rather when they appreciate relations between the people and objects in their environment, infer how it affects their own goals and behave adaptively (Walle & Campos, 2012). This appreciation can be measured in terms of the infants' regulating their behaviour as a function of the emotion that the other is experiencing.

A third advantage relates to explaining collative variables. Collative variables are intrinsic stimulus properties (e.g. novelty, 'surprisingness', complexity, incongruity, ambiguity, pitch, hue) that determine the strength and direction of exploratory behaviour (Berlyne &

McDonnell, 1965), or the 'orienting response' (Frijda, 1986). In other words, these variables automatically affect where we look and for how long – there is no subjective evaluation. According to this theory (Berlyne, 1960, as cited in Silvia, 2005), these properties elicit interest. However, if this were the case, it would be describing affective phenomena which are not readily explained by appraisal theories of emotion and would suggest that for some objects to be evaluated as interesting, a judgement is made on the basis of the implicit qualities of the object, rather than its subjective qualities – it is not related to the goals of the individual, it simply *is* interesting.

Silvia points out that past theories of interest, such as information conflict (Nunnally, 1981 as cited in Silvia, 2005) or information gaps (Loewenstein, 1994) include some version of the collative variables, and there is a wide range of strong empirical support across measurement types: populations, types of stimuli and across different cultures (for a more detailed summary, see Silvia, 2006, p53). However, as described earlier (section 1.2.1), Silvia's own theory of interest (2005) is based firmly within the appraisal school and posits two appraisals: novelty/complexity and coping potential. In short, for something to be interesting it has to be 'new' and neither too easy nor too complex. While this may suggest that collative variables do not exist, there appears to be some evidence that stimuli which are highly relevant in biological terms may elicit automatic processing (pictures of human babies v human adults in Brosch, Sander & Scherer, 2007; pictures of angry adult faces v neutral adult faces and pictures of human babies v human adults in Brosch, Sander, Pourtois & Scherer, 2008), suggesting that no subjective explanation is necessary, although the authors themselves frame the results in terms of stimuli that are highly relevant for the individual (Brosch, Pourtois & Sander, 2010), thus maintaining an appraisal perspective that is compatible with the results.

Given that an emotion appreciation account is concerned with emotion recognition in others, it is not directly concerned with whether there are a certain class of variables or stimuli

that affect attention, but this discussion highlights how that which may be a limiting factor of appraisal theory does not limit emotion appreciation.

8.2.3. Limitations

There are three main criticisms that can be imagined about this approach as it is described here and each relates to the fact that it is presented as third-party emotion recognition. Firstly, as a third-party approach, it necessarily cannot tell us anything about emotion as it is experienced in the first person – how it feels, nor about the physiological reactions (e.g. heart rate, muscle tension, temperature changes), nor the brain correlates of any emotional reaction. Of course, indirectly, it may be that third-person inferences are at least indirectly made from past personal experiences of similar situations (see section 2.5 on 'internal source of information).

Secondly, emotion appreciation may be criticized as being concerned with a series of static relations rather than a dynamic, evolving process. This was originally pointed out by Parkinson in relation to affective social learning (Parkinson, in press) and may be aimed at emotion appreciation too. Further research is needed to try and address this.

Thirdly, this approach tells us nothing about the interpersonal factors in emotion communication that is such an important and relatively overlooked aspect of emotion research (Parkinson, 1996; Van Kleef, De Dreu & Manstead, 2010). It is rather more modest then, in its scope, as it centres on what can be learned from others, when the others are unaware that they might be serving as 'teacher'.

8.2.4. Extending the emotion appreciation approach

In framing this thesis, I have consistently employed the term "infer" to describe the process by which a third party identifies how another individual is feeling and how they are likely to act as a consequence. I used 'infer' because a third-person cannot be entirely sure or 'know' what another individual is experiencing: the knowledge is subject to a 'correctness

condition' in that we can be right or wrong about the inferences we make. However, I did not want to give the impression that emotion appreciation is necessarily about categorisation or identification of emotions. Indeed emotion appreciation fits perfectly with the notion of adjusting one's behaviour without consciously identifying any emotion at all (Parkinson, 2009).

It should be pointed out that the word 'appreciation' has been chosen with care. Similar terms to describe similar phenomena are already widely employed, such as emotion -perception, -understanding and -recognition. Sometimes it seems the terms are used interchangeably, but sometimes they are intended to mean something slightly different. Given that their use is not clear, I will very briefly propose a taxonomy of these terms as I see them, in order to situate emotion appreciation, before explaining the reasons for differentiating them along such lines.

Before I begin the taxonomy, I would like to suggest that the term 'emotion recognition' is employed so liberally that it could almost be described as the generic term for all phenomena of this type. While its original meaning would have necessarily included the use of memory (i.e. re-cognition), it is so widely used now that it seems to cover all phenomena of this type, even occasions when the recognition process is supposed to be automatic (or at least, when there is minimal deliberation – see Tracy & Robins, 2008, "The automaticity of emotion recognition"). As I understand them, the following concepts fall under the umbrella term of 'emotion recognition', with the exception of perception itself.

Perception: a short-term episodic event that involves the registering of the behavioural marks (of the emotion).

Emotion perception: Identification of a particular emotion based on immediately available information and without necessarily taking the object or context into consideration. This may be non-verbal and unconscious in which case it can be evidenced by reacting in a fitting and

proportional manner to the emotion itself. The typical emotion recognition test that uses the Ekman stimuli is usually a verbal emotion perception test used on static facial stimuli.

Emotion appreciation: Emotion perception + the ability to grasp or estimate the nature, worth, quality, or significance of the person-object-environment relations. This includes the ability to evaluate the emotion – tell whether and why it is fitting, whether it is proportional and why. This too may be non-verbal and unconscious in which case it can be evidenced by reacting in a fitting and proportional manner to the emotion**,** in light of its relationship to the context and goals of the emoter.

Emotion understanding: Emotion appreciation + conceptual grasp of the emotion involved. This includes the ability to further evaluate the relevant emotion and across instances of other episodes of the same emotion, to compare it to episodes of other emotions and to understand the social and moral functions of such emotions (see Castro et al., 2016). This is necessarily a verbal and conscious process.

The word 'perception' suggests something too fleeting or sensory to me, to describe the emotion recognition process I am trying to formulate. Take the following two sentences: "I perceive a man walking down the street and I appreciate why"; "I appreciate a man walking down the street and I perceive why". The first sentence seems to work better, particularly because we expect the word 'appreciation' to pick out something more involved than mere sensory awareness. It is also worth noting that, in the second sentence, the word 'perceive' seems to mean more than it does in the first – again, it implies something more complex. Of course, this distinction can be muddied by the example of a third sentence: "I see a man walking down the street and I see why". This seems to make perfect sense too, but this is due to the ambiguous nature of the word 'see': while seeing can clearly be used in the perceptual sense – "I see the cup", for example, it can also mean more – "I see what you mean", for example. In the third sentence above, both types of 'see' are present and the second 'see' again means something

greater than the more perceptual, first one. It seems that the reasons for the man walking down the road are more readily subject to *appreciation* than to *perception*. Appreciation, then, fits more comfortably in the place in the sentence where more is expected of the word.

The term 'emotion perception' is included here, due to the philosophical debate of whether it is possible to perceive that someone is sad, or that we infer that they are sad from perceiving that they are crying. In any case, even if perceiving sadness is possible, emotion appreciation appears to be more involved somehow. At first glance then, emotion perception seems to be too 'thin' a concept – emotion appreciation seems to mean more.

Etymologically speaking, the word 'appreciation' comes from Late Latin *appretiare*, which means to "estimate the quality of". In the online Merriam-Webster dictionary, the first definition offered of "appreciate" is "to grasp the nature, worth, quality, or significance of". This is very close to what I intend to describe in this approach: emotion appreciation then, is the ability to grasp or estimate the nature, worth, quality, or significance of the person-object-environment relations.

While 'emotion perception' might not mean as much, the term 'emotion understanding' seems to mean too much, to be too cognitive. As I have already stated, I would like emotion appreciation to describe how we take into account someone's relationships with the people, objects and ideas in their environment. It is more encompassing than identifying a facial expression and can involve information that is not always immediately available to the naïve onlooker but does not necessarily include conceptual mastery of the emotions. Emotion understanding has come to mean much more than what I intend by the term "emotion appreciation". In a recent article (Castro et al., 2016), it was pointed out that studies on emotion understanding in adults include abilities to monitor and represent inner states, differentiate emotions in self and others, and understand the social and moral functions of emotions. Even though the term emotion understanding may be used to mean less in developmental studies, it nonetheless seems a 'thicker' concept than what I intend.

In this thesis, I have described emotion appreciation in terms of being a more holistic consideration of the person-object-context than is the orthodoxy in emotion recognition. I argue that it is through emotion appreciation that we can best evaluate the relation that the person has to the object in that particular context. While this process has been characterized in descriptive terms in chapter 5 (on the link between social cognition and emotion), and was illustrated by examples where facial expressions were not present at all, in spite of the affective nature of the person-object-context relation, the description remained on a behavioural level. Nothing has been said yet about the cognitive mechanisms involved. And perhaps it is in a description of the cognitive processes involved in emotion appreciation that a clearer distinction can be found between the various emotion recognition terms considered here. While this is clearly something that would be suitable for future study, I would like to suggest how such research might begin, and I would like to begin with inferences.

How do we get from perceiving the various parts of the objects in our environment to an understanding of how we should negotiate, manipulate and value those objects? Let us assume that we can literally perceive that someone is crying.[26] It may even be possible, according to some philosophical theories, to see that a person is sad, presumably, in part, because sadness is most often associated with crying. This would amount to emotion perception. Going a step beyond this we get emotion appreciation. If our observer notices that the person is wearing a red and white scarf and they know, not only that supporters of Aberdeen Football Club wear such a scarf but also that they have just won the cup, our observer could infer that the person is actually crying with joy. Here the observer has a more nuanced view of the emotional situation. In this case, it would seem that the use of inferences elevates

[26] There is, of course, the radical argument that all we can really perceive are shapes and colours and that everything else is inferred (à la Tyler Burge), but this argument is not very helpful here. Any such argument would need to explain how the inferences used to distinguish crying from shapes and colours are different from the inferences used in emotion appreciation (i.e. using information that was not immediately available). Their distinction would mark the same distinction that I would like to make between emotion perception and emotion appreciation.

emotion appreciation above mere perception (or indeed, emotion perception). In emotion appreciation the inference can be made using information that was not immediately perceptually available and contributes to the observer's grasp of the emotional situation.

It may be important to note that the inferences here are based on finding and appraising the goal-related behaviour of the football fan: while the perceptual take of identifying how the person is feeling can be carried out irrespective of the goals, emotion appreciation depends on connecting the behaviour to a goal that is not necessarily, immediately apparent. This is not to say that emotion appreciation is not a perceptual process, rather, it is also a perceptual process. Perceiving Samuel screaming and running as fast as he can from an aggressive lion is enough to appreciate that he is scared, for anyone who is minimally socially intelligent. Again, this need not be a verbal identification and thus may be possible in young children and some sufficiently endowed animals.[27] It would be interesting to study whether describing emotion appreciation as including perception and inferential processes would be fruitful.

An alternative line of research to find the cognitive mechanisms involved might include Gibson's still radical theory of affordances (described earlier). The theory asks whether the actual composition and layout of surfaces "constitute what they afford", because, "[if] so, to perceive them is to see them… imply[ing] that the "values" and "meanings" of things in the environment can be directly perceived," (Gibson, J.J., 1979, p. 127).

Here, the distinction between 'perceived' and 'appreciation' might again appear blurred. Of course, there is great debate in philosophy about how 'thick' a concept 'perception' is, but for the reasons that I have already outlined, I think that it is better to reserve 'perception' for occasions when information is picked up almost entirely by the senses, in a quasi-automatic, minimal cognitive fashion. So can affordances be perceived or are they appreciated?

[27] The observer would need to be able to recognise that the relationship between Samuel and the lion is more than simply mechanistic (like two magnets). The question of how much cognition or social intelligence would be required is an empirical one and could be the subject of future research.

There is an argument that we can directly perceive the person-object-context relation, that there is "information contained in [expressions] that can be picked up by an observer *before* interpretations and attributions are made (Frijda & Tcherkassof, 1997, p.85, *italics in original*). In this sense, 'infer' readily equates with 'know', at least until the inference or the action taken on its basis proves to be false.

Frijda and Tcherkassof (1997) argue that there are three ways in which such an *appreciation* (my term) can be manifested. Firstly, they report that seeing someone else's expression may give clues about the object that the person is attending to. For example, depending on the expression, it may lead the observer to look around them for a threat, or alternatively, to look more closely at the object. Secondly, they argue that someone else's expression may lead to a change in the observer's affective state and their own likely behaviour towards the object. Finally, it may lead to empathy, as an observer can identify the expression as one that belongs in her own 'expressive repertoire' (Frijda & Tcherkassof, 1997, pp.85-86.).

Using the earlier description of a football fan who is crying with joy (p. 190), it is, in some sense true to say that an emotion appreciation of the fan would lead to the belief that they are sad and may result in feelings of empathy leading to a comforting arm around the shoulder, even thought the person is joyful. Given the constraints of the method used (emotion perception), the empathic reading was as good as it could be and led to an erroneous sympathetic reaction. However, given that emotion appreciation is a more holistic method of recognizing the emotion that the person is likely to be expressing (taking into account their goals etc.), the empathic reading of the fan crying should inevitably be correct – the observer should be able to correctly recognize that the fan is joyful.

To reiterate, the three possibilities for appreciation may happen *before* categorisation has taken place. In this sense, we may act on the basis of the inference, without 'thinking', whether or not we have inferred correctly. Any of the three scenarios mentioned would qualify as manifestations of emotion appreciation. But how much of the *context* of the expression can be

appreciated in this way, quasi-automatically and before the expression is categorised?

A first step to answering this question can be taken by accepting that 'culture' can provide 'context', at least in certain circumstances. The concept of culture that is most prominent in social psychology considers culture as a static entity with a relatively fixed set of beliefs and social forms (Adams & Markus, 2004), probably, at least in part, as a result of the usefulness of such a concept for experimental design as a categorical or independent variable (Adams & Markus, 2004; Parkinson & Manstead, 2015). This conceptualisation allows for cross-cultural studies whereby, for example, the ability to recognise certain emotions and the processing of those emotions is compared between two 'cultures'. In practice, this usually involves comparing groups from different countries and ethnicities (e.g. Stanley, Zhang, Fung & Isaacowitz, 2013). However, in an attempt to define 'culture' in a way which could be more useful to social psychologists, Adams and Markus suggest that culture should not be seen as a static phenomenon, nor as an 'extra-level' to be added to basic experience, but rather, as something which "resides in the everyday worlds that condition basic experience in the first place" (Adams & Markus, 2004, p.343). They propose a theory of "cultural patterns" which are "historically derived and selected ideas" and which can be considered as products of action and as conditioning elements for further action, rather than a theory of "culture as a state"[28] (Adams and Markus, 2004). One of the main implications of the theory for emotion recognition of their suggestion is, they argue, that cultural influence begins with determining which objects are appraised and how objects are appraised (see also Kaufmann and Clément (2014) on intentional paths drawn by culture). Cultural identity may provide a context then, in terms of group-bias in interpersonal terms and in relevance seeking and processing in intrapersonal terms. Presumably the cultural (ingroup-outgroup) distinction occurs either prior to, or concurrently with, the appraisal of the other's object-context relation.

[28] The full definition is found on page 341 and reads as follows: "Culture consists of explicit and implicit *patterns* of historically derived and selected ideas and their embodiment in institutions, practices, and artefacts; cultural patterns may, on one hand, be considered a(s) product(s) of action, and on the other as conditioning elements of further action (based on Kroeber & Kluckhohn, 1952, p.357 as cited in Adams & Markus, 2004).

A second step to accounting for the quasi-automatic nature of appreciating the context of an emotional expression is found in Frijda and Tscherkassof's (1997) description of these ways of manifesting an appreciation before categorisation, as being of a "Gibsonian perspective" (p.85), in honour of J.J. Gibson's ecological approach to perception, and with specific reference to *affordances* (Gibson, 1979). Gibson's theory of affordances comprises the idea that objects are not just perceived in terms of their physical characteristics (height, length, colour, textures…) but also in terms of how they can be used, or what they can do, given the context: a chair is perceived for its 'sitability' for example, or a knife for its 'graspability' or its 'cutability', while an apple may be perceived in part for its 'ability to be cut' or its 'edibility'. According to such theories, perception extracts the 'actionable qualities' of objects in the environment that are relevant to the well-being of the individual (Ambady & Weisbuch, 2011). Importantly, the theory does not only concern inanimate objects but people and animals too. This, then, is presumably what Frijda and Tscherkassof meant: emotional expressions of others offer possibilities of action in response: an individual's angry expression is likely to lead to afford one type of response in an observer (perhaps the target of anger), whereas a scared expression likely affords a different response.

Kaufmann and Clément (2014) have recently extended the idea of social affordances by assimilating the "demand character" aspect of objects proposed by Koffka (1935, p.7, as cited in Kaufmann & Clément, 2014). The argument is that an apple is not only perceived as 'cutabile' or 'edibile' but also as its *demand* to be cut or eaten, as if a chair *demands* to be sat on: a demand is made on the person by the demanding affordance of the object. These affordances are immediately and commonly apparent, in the sense that if one member of a species can perceive them, all members of a species can perceive them, although they may not be acted upon at each occasion. In fact, they are more likely to be acted upon if the individual is hungry. Of course, these particular affordances in an apple will not present themselves to a fish, even if the fish is hungry.

Affordances are relational and depend therefore on the object, the person and the context. They may be 'temporally contextual' in the sense of an apple demanding to be eaten at snack time, 'culturally contextual' in the sense of a statue of the Virgin Mary demanding to be knelt in front of, or 'socially contextual' in the sense of intervening if an older child is beating a younger child. Indeed, Kaufmann and Clément (2014) argue that social affordances are different in an important aspect from the physical affordances of inanimate objects: the social affordances come with a guide of how one *ought to* act. Thus social affordances become *deontic affordances*. From a third person point of view, we would expect a religious person to kneel before a deity and an adult to stop bullying. The actions are anticipated and any deviance will 'pop out' and elicit an inquiry.

It follows that if we detect that someone is angry with us, a particular response is 'demanded' of us (see also, Grèzes & Dezecache (2014) for a discussion of the neuro-scientific literature on how this emotion-action matching might occur). This is what Frijda and Tscherkassof (1997) appear to be referring to concerning expressions of emotion. Perhaps too, the frustration in the person-object-context relation of the person standing in front of a closed cupboard door with their arms full (described in chapter 5 and taken from Warneken & Tomasello, 2007) is appreciated in terms of the affordance that is created by the situation: the child is 'demanded' to go and open the door by the perceived person-object-context relation. In summary then, it appears that social relations, such as dominance and emotional expressions**,** such as anger, may afford**,** in the second or third party observer**,** an action of *how to* respond.

It has been shown that dominance can be inferred by pre-schoolers in a relationship (between two puppets) from a rich source of 'clues'; in one experiment, dominance was inferred between two puppets from physical supremacy, decision-making power, age and even on access to resources (based on the number of coloured pencils each puppet had), and between two cartoon characters based on their respective body and head postures (Charafeddine et al., 2015). Furthermore, inferences were not only *drawn to* dominance relations but also *drawn from*

dominance relations, as the participants inferred that the dominant puppet would win a competitive game against the subordinate and have more resources. Additionally, it appears that children are sensitive to dominance when they are asked to distribute their own resources, although there is an age effect as 3-4 year olds give more to the dominant party and 8-year old children give to the subordinate (Charafeddine, in press). Infants as young as 9-10 months old have been shown to expect small agents to act in a certain way toward bigger agents (Thomsen, Frankenhuis, Ingold-Smith & Carey, 2011) and infants aged 15 months have been shown to expect dominant-subordinate relationships to be stable over time (Mascaro and Csibra, 2012). While it is becoming clear that these social relations and deontic affordances are perceived by young children, there is also some evidence that other non-human primates (Silk, 1999) and birds (Paz-y-Miño, Bond, Kamil & Balda, 2004) are sensitive to dominance relations and regulate their behaviour accordingly, while even fish appear to infer social rank (Grosenick, Clement & Fernald, 2007).

From a second person perspective then, deontic affordances permit even infants and non-human primates to "foresee what is the appropriate way to respond to such and such behaviour without resorting to explicit norms" (Kaufmann & Clément, 2014, p.465). From a third person perspective, the same is true[29]. When people speak politely with their boss, defend their country and pay their debts, everything runs as expected. But if someone acts aggressively to their boss (or their teacher, or their parents...) we expect the boss to become angry to reassert their dominance, if someone disrespects their country (or their team, or their family), we can expect people to be hurt (sad, ashamed etc.) and if people are not paid back, we can expect people to be angry, disgusted.

[29] An interesting alternative is proposed by Nanay (2011; 2012; 2013). He describes *vicarious perception* whereby the observer perceives affordances in the object for the other person, rather than ascribe a mental state to that person on the basis of their relation with the object. Furthermore, he describes vicarious emotional engagement whereby it is possible to detect an emotionally relevant object on the other's behalf – for example, a spider crawling to your arachnophobic friend without them knowing (Nanay, 2013). He describes vicarious emotional engagement as "very simple, quasi-automatic, and, arguably, perceptual process" (2013, p.156).

Kaufmann and Clément (2003) describe these social relations (dominance, cooperation, competition) and patterns of action (fighting, sharing, reconciling, playing) as "universal social forms" (Kaufmann & Clément, 2007, p.226). These forms "make others' behavior highly predictable and turn the social world into an orderly place" (Kaufmann and Clément, 2007, p.226). The space then, from intrapersonal emotional processes that dominate affective science to more socio-cultural affective processes**,** can be perhaps bridged by linking the affordances offered by an emotional expression to the affordances offered by social factors and the demands made on the observer in each case.

Emotion appreciation is then, perhaps, simply recognition of the social affordances offered or demanded by others' reactions to universal human predicaments in light of the affordances offered or demanded by universal social forms. Furthermore, given that the way in which we respond to those affordances appears to be elicited, guided and constrained by culture and, more generally, by context, the case for arguing that emotions are imbedded in social relations could hardly be made stronger. Finally, perhaps when we appreciate the relation between person and object in the particular context, it is not necessarily only through consideration of the other and their circumstances, but the demands that those circumstances make on us through their deontic nature: "I know you were angry because I felt like running away". An alternative view is proposed by Dretske (1973) who argues that it is no more difficult to see that someone is angry than that her eyebrow is raised. He points out that we can directly see when someone is angry, even if we cannot see anger.

Whether through affordances or a perhaps more direct perception, if emotion appreciation is to be argued to be automatic or quasi-automatic (see section 1.1.3, especially research by Aviezer and colleagues and by de Gelder and colleagues), it may suggest that a better name than emotion appreciation for the processes described here would be 'emotion apprehension', since this name captures better the direct and immediacy of the perception of the emotion, whereas appreciation may suggest something more cognitive.

It seems that a third-person approach can either see 'the other' as an individual who is capable of having tastes and biases or objectively, as an agent worthy of study and who represents the norm and without any particular point of view (Goldie, 1999). This touches on questions of empathy (Deonna, 2007). To what point can the processes involved in emotion appreciation be described as empathic? Are the observer's feelings aligned in some way with those of the other? If this is the case, then the identity of the other becomes of paramount importance, as the observer is likely to base their appreciation on the nature of her relationship to them and what she knows about the individual. Or alternatively, does the observer put themselves in the shoes of the other with a view to appreciating how they feel? This would again have consequences for emotion appreciation: I might be afraid of sponges and feel scared as I watch someone wash some chocolate from their face. A further illustration of this comes from reconsideration of the example taken from the television scene (section 1.1.5). The very fact that the person was a young male with a certain style induced the inference that he was expressing anger (or aggression) rather than fear for the 'poor old lady'. His style and identity were taken into account to infer anger in his expression, which in turn afforded a fear reaction for the viewer. Had he been dressed differently with a more sober haircut etc., the inference would have changed and the affordance would have been different. If this scene were witnessed in real life with the original identity of the man, perhaps the onlooker would call to the old lady to warn her of the angry man, but in the alternative example, perhaps an onlooker would rather infer fear in the young man and turn to see what the object of fear was. But perhaps something more neutral occurs: perhaps, at least as a first step, an inference is made based on the general type of circumstance that is presented before the specific person-object-context is taken into account.

It seems intuitively that there are cases where the identity of the person is irrelevant. For example, it would be possible to appreciate that, as a general rule, someone who has a gun pointed at them is likely to experience fear. It would be enough to see someone knowingly have

a gun pointed at them to 'infer' fear. Philosophers make the distinction between seeing and perceiving: seeing is related to knowledge – we cannot see a hallucination, but we can perceive one, for example. In these types of cases, where a clear danger is present, it seems possible that the observer could *see* manifestations of fear in the person-object-context relation. There are occasions then when it would be correct to assume that *emotion can be seen in the context.*

But what of occasions where it is less clear? What if, unbeknownst to the observer, the observed person is aware that the gun is not loaded and that the police are at the door ready to arrest the person wielding the gun? Surely the observer would perceive fear in the relation anyway, only to realise their mistake later.

In the first instance, and as Goldie (1999, p.399) points out, "there is often an apparent immediacy and reliability with which we grasp another's emotions, and, to a lesser extent, their mood and character through observation of their expression of emotion, including facial expressions and intonations of voice, and of their observable bodily changes and states", but, he continues, to fully understand the whole picture, one must take into account the object itself, the desires of the other and their mood. Indeed, he states: "It is only by taking the most simple example, and then by describing that example in the barest detail, that the importance of mood, emotion and character may come to seem irrelevant in determining how a person perceives things to be" (Goldie, 1999, p.401).

It seems possible then that there is a first, objective apprehension of the person-object-context that relies on appreciation of universal human predicaments, goals and universal social forms, and a second, more deliberate apprehension to understand the particular instantiation of the emotion. This second step would be particularly likely if the inferences made in the first step proved false. Further research is needed to determine the existence of these two steps that, *prima facie*, appear to be two separate systems of identification and understanding.

A focus on 'cultural patterns' rather than 'static culture' may prove useful to affective scientists interested in the social aspects of emotion, and the theory of deontic affordances could

be particularly pertinent for how we appreciate person-object-context relations. But a socio-ecological approach pretends to include phenomena on an even grander scale. In a recent description of this approach (Oishi & Graham, 2010), the authors opined that social ecology would, counter to social psychology's focus on 'intrapsyhic' processes of the last 40 years, encourage links between social psychology and sociology, in the same manner that cultural psychology is linked to anthropology, evolutionary psychology is linked to evolutionary biology and behavioural economics is linked to economics. They describe this approach as, "a perspective focused on delineating how physical, societal, and interpersonal environments (e.g. climate, democracy, social networks) affect the emotions, cognitions, and actions of groups and individuals and how those emotions, cognitions, and actions in turn create physical, societal, and interpersonal environments" (Oishi & Graham, 2010, p 357). As for examples of research in affect which have used this approach, they point to the work of Bronfenbrenner (1977) in encouraging developmental psychologists to think about how the child's cognition, emotion and behaviour develops in the child-mother dyad, as a family, in school and research on the effects of weather on daily mood (Denissen, Butalid, Penke & van Aken, 2008). A more recent, real-life example of the kinds of phenomena which they suggest should be taken into consideration, comes from a letter recently sent from over four hundred psychotherapists, counsellors and academics to the Guardian newspaper, warning of the deleterious effects of the politics of 'austerity' in the United Kingdom. Decrying the "profoundly disturbing psychological" implications of government policy, the letter states that their patients were bringing up issues that caused them distress, namely "increasing inequality and outright poverty, families forced to move against their wishes, and, perhaps most important, benefits claimants (including disabled and ill people) and those seeking work being subjected to a quite new, intimidatory kind of disciplinary regime" (The Guardian newspaper, 2015)[30].

[30] www.theguardian.com/society/2015/apr/17/austerity-and-a-malign-benefits-regime-are-profoundly-damaging-mental-health

While it is impossible to imagine that the political and economic context could be perceived in someone's emotional expression, it is not inconceivable that an emotion appreciation account could include such information. If the observer is aware of the economic circumstances of the country, or of one particular group of people within that country, if she perceives the person to be a member of that group, this may inform her appreciation of the emotional expression.

A truly social account of emotion recognition may need to take all of these factors into account**,** as social psychology incorporates other branches of the social sciences: anthropology, sociology and political economy. An emotion appreciation account seems potentially equipped to meet the demands of such a project.

There are similarities between emotion appreciation and in particular with affective social learning in previous work carried out by Olsson and Phelps (2004; 2007). They point out that it is particularly important to try and learn from others' relations to objects in the environment when the objects can be risky, for example, in recognizing other people's fear (Olsson & Phelps, 2007). This can obviously avoid the need for observers to experience the risk for themselves. In one experiment (Olsson & Phelps, 2004), participants were assigned to one of three conditions: a Pavlovian (direct-learning) condition, an observational learning condition and an 'instructed' condition. The participants were told that the experiment was designed to measure physiological reactions to human faces and that electric shocks would be administered during the experiment. In the Pavlovian condition, participants received small electric shocks when a particular stimulus (CS+) was presented; participants in the observation condition saw films of people reacting to the CS+ and the accompanying shocks; the participants in the instructed learning group were told that the CS+ stimuli predicted a shock i.e. they were neither given direct experience of the shock nor allowed to see others having the shock administered. While all three groups subsequently 'learned' to associate the stimuli with the shocks in an unmasked condition (i.e. when the stimulus was clearly perceptible to the

participants), the participants in the Pavlovian and observational conditions still reacted physiological (measured by skin conductance response) to the conditioned stimuli when it was masked. The authors explain the results by arguing that, "although abstract representations of associations between specific objects and their aversive implications are enough to prepare the individual for action and guide his or her behavior, the individual will express an emotional response only if these representations are accompanied by explicit awareness of the target" (p. 826). In other words, being told that a particular neutral stimulus is actually dangerous only works at a conscious level, while experiencing the consequences oneself or observing someone else suffer the consequences, is enough for the reaction to become automatic.

Indeed, there is substantial cross-species support for the idea that fear can be learned from others, particularly when the observer is explicitly aware of the stimulus used and when the stimulus is naturally aversive – as is the case for electric shocks, for example. In one such study, mice who have observed other (model) mice being attacked by biting flies reacted just as strongly as the model mice when exposed to the flies 24 hours later, even when the biting parts of the flies have been removed (Kavaliers, Choleris & Colwell, 2001).

Phelps and Olsson (2007) describe this social learning of fear as offering "the opportunity to study the transmission of biologically relevant information between individuals," and argue that "social learning may lie at the core of the forces that create and maintain culture, which might then affect biological evolution" (p. 1100). This, it seems, is strikingly similar to claims that we have made about affective social learning, in the sense that we describe affective social learning as a conduit for the social transmission of social value and a means by which culture can be transmitted and perpetuated (see chapter 2, for example). But in this definition, we also find the main difference between the two claims: while Phelps and Olsson limit their claims to the learning of *fear* (although this could be, presumably, extended to other emotional expressions), their claim and the evidence they provide and cite relates to naturally aversive stimuli, while we argue that any affective evaluation may be transmitted. In other words, while

Phelps and Olsson describe how witnessing conspecifics undergo electric shocks (or even hearing about the shocks, in the case of humans), or biting flies in the presence of a certain stimulus can lead to fear of that stimulus, we argue that such affective evaluations can be learned about objects that have no naturally occurring aversive quality. For example, a particular haircut, a certain style of dance, or a specific idea can become a source of ridicule or respect depending on how those around us evaluate it, even if we would not have otherwise given them much consideration at all: objects that may have left the observer entirely indifferent can become very value-laden through exposure to the affective reaction of others.

A recent study of the social learning of fear in fear-relevant (naturally aversive) and fear-irrelevant stimuli, revealed stronger acquisition effects for fear-relevant (snake and spider), verbally conditioned stimuli compared to fear-irrelevant (bird and butterfly), verbally conditioned stimuli (Mertens, Raes & De Houwer, 2016), thus confirming the "only relevant study" (Mertens et al., p. 20), that had been carried out nearly forty years earlier (namely, Hygge & Öhman, 1978). Clearly more empirical research is necessary to understand the conditions under which 'affective values' can be spread and to evaluate the type of value that might be concerned. Perhaps verbal communicated transmission works better for some values. Indeed, perhaps under some conditions, verbal communication is the only way to transmit such values. In any case, these two studies perhaps signpost one method to begin such research.

Indeed, many promising lines of research could be inspired by the work presented on these pages. Concerning the approach itself, it would be interesting to go beyond visual perception to include vocal (Banse & Scherer, 1996) and even tactile modalities (Hertenstein, Keltner, App, Bulleit & Jaskolka, 2006; Hertenstein, Holmes, McCullough & Keltner 2009), particularly as both of them can be studied in second and third-party perception. For example, chimps show 'surprise', in terms of longer orienting responses, when they have heard what they think is a lower-ranked member challenge a higher-ranked member of the group (Slocombe, Kaller, Call & Zuberbühler, 2010).

The work on social appraisal could be extended too, beyond the suggestions already made above. As was mentioned earlier, while definitions of social cognition have perhaps principally focused on the mental states of others and predictions of their behaviour ("on others" – Baillargeon, Scott & Bian, 2016; Fiske & Taylor, 2013), one alternative would be to focus on the information itself (from others – Harris, 2012; Clément, 2010). It could be argued that the study of the information provided to us by others also falls under the term 'social appraisal'. Whether someone tells us that a film is worth watching, or we have to decide whether the majority or expert minority are better sources of information, we are taking into consideration other people's affective views about an object. It has already been shown that adults and infants as young as 3-years-old trust the testimony more of people who look happy than those who look angry (Clément, Bernard, Grandjean, & Sander, 2013). Incorporating this 'affective testimony' into social appraisal could be conceptually worthwhile.

As far as social appraisal is concerned more generally, this thesis aims to develop the conceptual definition of social appraisal while extending the scope of what might be meant by the term. It could be argued that the examples used to highlight emotion appreciation's reach into areas of social cognition also fall under the term of social appraisal*:* a closed cupboard door has no value at all until we see someone with an armful of books who desires to open it, for example. While Manstead and Fischer initially hoped that their formalization of the term would encourage emotion researchers to consider the social aspects of affective research (Manstead & Fischer, 2001), both authors have renewed these efforts since (Fischer & Van Kleef, 2010; Parkinson & Manstead, 2015;). It is in this tradition that the approach of emotion appreciation is proposed, as we focus on what we can learn from others' affective relations with the objects in their environment. In this thesis, I hope to have honoured the intentions both of those who coined the term (Campos and Sternberg, 1981) and those who formalized it (Manstead & Fischer, 2001).

The emotion of interest was used here to illustrate how an emotion appreciation approach can be more inclusive than an orthodox approach to emotion and emotion recognition. Elsewhere we have argued that, in spite of the fact that all emotions could loosely be described as being epistemic (Campos & Dukes, 2016), there is a possibility that there is a family of emotions related to informativeness (Lauria, Dukes & Clément, in review), that each elicit curiosity (although see Brady (2010), who argues that curiosity is an emotion and Kashdan and Silvia (2009), who argue that curiosity and interest are essentially the same thing). While the relationship between curiosity and interest still needs to be ascertained, epistemic emotion, of which interest is surely the prototypical emotion, appears to be a very fertile and growing area of research. While the main focus in this thesis has been given to what we can learn from the emotion of others, we have also pointed out that whether the emotion is our own, or whether it is observed in someone else, it can play a role in what we choose to learn, what we actually learn and how we learn. The work presented here on interest, could be extended then by a comprehensive review of the epistemic literature, particularly because it appears to be in need of structuring. For example, while most philosophers and psychologists alike would agree that fascination is a type of emotion, that 'tip-of the-tongue' is a feeling and, slightly more controversially, that curiosity is a desire (and therefore not an emotion), all three of these phenomena are generally categorised as 'epistemic emotions' in the literature. Clearly, for the role of emotion in learning to be fully appreciated, it would certainly be worthwhile to propose a taxonomy of epistemic emotions and their affective associations.

8.3 Concluding remarks

I can remember my parents leaving my younger sister and me with a babysitter to go to the theatre one evening when I was about 9 years old. I had been to the theatre before and had

really enjoyed all the music and comedy of the Christmas pantomimes. However, I was told that they hadn't been to see the pantomime, but rather a mime show for grown-ups, which they had both found fascinating. They said that the emotion had been so well portrayed, that they had hardly noticed there was no dialogue. I found it hard to believe that actors could captivate adults for the length of a show without speaking to each other, and my disbelief was compounded when I later heard that, in fact, the actors had worn fixed wooden masks throughout the show. All the expressions of emotion that my parents had found so wonderfully portrayed had been communicated by the way the actors moved or postured and was understood in light of the context in which the characters had found themselves. When I began bringing together the pieces of this thesis, it became apparent that we had used an approach to emotion recognition that was very different from the orthodox view and it seems unlikely that someone holding a strict orthodox view of emotion and of emotion recognition would be able to explain the enjoyment that my parents had at the theatre.

But while emotion appreciation could provide a better explanation, and may be seen as novel, its roots can clearly be found in appraisal theory, and they are particularly salient in the social appraisal 'corrective' to that literature. It is hoped that this approach can be used to join the calls for a change in focus, to move the debate in the emotion research community away from discussions about intrapersonal affective processes. It is also hoped that it could open up new research opportunities for researchers in emotion, as this comprehensive approach seems ideal to tackle areas that have hitherto been affect-free. And while any naïve observer watching me as I type this, may not be able to recognise this hope facially, or even posturally, a way for someone using an emotion appreciation method to detect that I am hoping, is to notice that I have my fingers crossed, which is mknaig it vrey dfciiulft to tpye.

APPENDIX

SUPPLEMENTARY MATERIAL FOR CHAPTER 6

Expressions of interest: Interest is recognized dynamically and in whole body form

Study 0 is the replication study. The replication study was carried out with volunteers who happened to be sat in the public areas of the University of Neuchâtel. The replication study was carried out using PowerPoint on laptops, rather than online. The results were so similar to those presented in the chapter that the decision was taken to only include them in the supplementary material. Study 1 is the study presented in the manuscript.

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1) **The recognition scores across the four conditions for all the expressions.** Scores are given in **percentage** (and in raw) terms. The column 'Total' refers to the average score (in percentage terms) for all the expressions (including neutral) except interest in each condition. This 'Total' score was the score against which the interest scores were measured.

Table A.1: The recognition scores across the four conditions. Study 0

	interest	Total	anger	disgust	joy	neutral	fear	surprise	sadness
static face	29 (30)	67	46 (48)	88 (92)	94 (98)	80 (83)	33 (34)	81 (84)	48 (50)
static body	63 (66)	67	55 (57)	66 (69)	78 (81)	93 (97)	51 (53)	87 (90)	39 (41)
dynamic face	60 (62)	75	46 (48)	68 (71)	85 (88)	92 (96)	66 (69)	83 (86)	87 (90)
dynamic body	73 (76)	76	57 (59)	86 (89)	66 (69)	97 (101)	73 (76)	88 (91)	65 (68)

Table A.2: The recognition scores across the four conditions. Study 1

	interest	Total	anger	disgust	joy	neutral	fear	surprise	sadness
static face	29 (144)	68	50 (251)	88 (441)	93 (465)	60 (302)	33 (167)	77 (386)	73 (365)
static body	62 (310)	65	56 (281)	63 (313)	71 (356)	81 (406)	55 (276)	88 (439)	41 (203)
dynamic face	55 (276)	74	54 (286)	78 (389)	85 (424)	76 (380)	62 (308)	80 (400)	81 (403)
dynamic body	75 (377)	65	51 (254)	61 (307)	62 (309)	82 (408)	68 (340)	86 (429)	48 (238)

2) The recognition scores for the static stimuli of interest. Scores are given in **percentage** (and in raw) terms. The falsely attributed expressions have been included

Table A.3: The recognition scores for the interest static stimuli. Study 0

Actress	Actress 1	Actress 1	Actress 2	Actress 2
Direction	Left	Right	Left	Right
interest	35 (9)	23 (6)	38 (10)	19 (5)
anger	0	4 (1)	4 (1)	0
disgust	12 (3)	23 (6)	19 (5)	8 (2)
fear	8 (2)	12 (3)	0	0
joy	0	0	0	19 (5)
neutral	23 (6)	15 (4)	31 (8)	54 (14)
sadness	15 (4)	12 (3)	4 (1)	0
surprise	8 (2)	12 (3)	4 (1)	0

Table A.4: The recognition scores for the interest static stimuli. Study 1

Actress	Actress 1	Actress 1	Actress 2	Actress 2
Direction	Left	Right	Left	Right
interest	34 (42)	26 (32)	34 (42)	22 (28)
anger	1 (1)	8 (10)	3 (4)	6 (7)
disgust	4 (5)	23 (29)	15 (19)	6 (7)
fear	0 (0)	0	8 (10)	10 (13)
joy	11 (14)	2 (2)	0	0
neutral	23 (29)	14 (17)	1 (1)	6 (8)
sadness	2 (3)	11 (14)	10 (12)	24 (30)
surprise	0	0	4 (5)	3 (4)
other	25 (31)	17 (21)	26 (32)	22 (28)

3)The false attribution matrices across the four conditions. Scores are given in **percentage** (and in raw) terms.

Study 0

Table A.5: The false attribution matrices across the four conditions.

Study 0. Static Face.

STATIC FACE		stimulus							
		anger	disgust	interest	joy	neutral	fear	surprise	sadness
Response	anger	46 (48)	6 (6)	2 (2)	0	0	0	0	0
	disgust	21 (22)	88 (92)	15 (16)	0	5 (5)	4 (4)	8 (8)	28 (29)
	interest	13 (31)	0	29 (30)	2 (2)	11 (11)	5 (5)	5 (5)	2 (2)
	joy	1 (1)	0	5 (5)	94 (98)	0	0	0	0
	neutral	10 (10)	0	31 (32)	0	80 (83)	9 (9)	0	1 (1)
	fear	2 (2)	4 (4)	5 (5)	0	2 (2)	33 (34)	7 (7)	16 (17)
	surprise	2 (2)	0	6 (6)	4 (4)	1 (1)	49 (51)	81 (84)	5 (5)
	sadness	7 (7)	2 (2)	8 (8)	0	2 (2)	1 (1)	0	48 (50)

Table A.6: The false attribution matrices across the four conditions.

Study 0. Static Body.

STATIC BODY		stimulus							
		anger	disgust	interest	joy	neutral	fear	surprise	sadness
Response	anger	55 (57)	2 (2)	9 (9)	1 (1)	1 (1)	1 (1)	1 (1)	0
	disgust	7 (7)	66 (69)	6 (6)	0	0	10 (10)	1 (1)	37 (38)
	interest	5 (5)	0	63 (66)	1 (1)	2 (2)	7 (7)	0	4 (4)
	joy	0	0	0	78 (81)	0	0	6 (6)	0
	neutral	29 (39)	0	8 (8)	0	93 (97)	1 (1)	0	5 (5)
	fear	1 (1)	7 (7)	0	0	1 (1)	51 (53)	6 (6)	7 (7)
	surprise	1 (1)	0	12 (12)	20 (21)	0	25 (26)	87 (90)	9 (9)
	sadness	3 (3)	25 (26)	3 (3)	0	3 (3)	6 (6)	0	39 (41)

Table A.7: The false attribution matrices across the four conditions.

Study 0. Dynamic Face.

DYNAMIC FACE		stimulus							
		anger	disgust	interest	joy	neutral	fear	surprise	sadness
response	anger	46 (48)	0	2 (2)	1 (1)	0	0	0	0
	disgust	40 (42)	68 (71)	5 (5)	0	1 (1)	8 (8)	4 (4)	4 (4)
	interest	5 (5)	0	60 (62)	1 (1)	2 (2)	1 (1)	5 (5)	0
	joy	0	0	0	85 (88)	1 (1)	0	0	0
	neutral	1 (1)	0	19 (20)	0	92 (96)	0	0	1 (1)
	fear	9 (9)	11 (11)	1 (1)	0	1 (1)	66 (69)	9 (9)	8 (8)
	surprise	0	2 (2)	11 (11)	13 (14)	0	18 (19)	83 (86)	1 (1)
	sadness	1 (1)	19 (20)	3 (3)	0	3 (3)	7 (7)	0	87 (90)

Table A.8: The false attribution matrices across the four conditions.

Study 0. Dynamic Body.

DYNAMIC BODY		stimulus							
		anger	disgust	interest	joy	neutral	fear	surprise	sadness
response	anger	57 (59)	0	0	1 (1)	0	0	0	1 (1)
	disgust	4 (4)	86 (89)	1 (1)	0	0	5 (5)	0	11 (11)
	interest	16 (17)	1 (1)	73 (76)	0	0	1 (1)	5 (5)	5 (5)
	joy	0	0	0	66 (69)	0	0	6 (6)	0
	neutral	16 (17)	0	2 (2)	1 (1)	97 (101)	0	0	7 (7)
	fear	1 (1)	4 (4)	1 (1)	0	1 (1)	73 (76)	2 (2)	2 (2)
	surprise	4 (4)	3 (3)	23 (24)	32 (33)	0	20 (21)	88 (91)	10 (10)
	sadness	2 (2)	7 (7)	0	0	2 (2)	1 (1)	0	65 (68)

Study 1

Table A.9: The false attribution matrices across the four conditions.

Study 1. Static Face.

STATIC FACE		stimulus							
		anger	disgust	interest	joy	neutral	fear	surprise	sadness
response	anger	50 (251)	2 (9)	4 (22)	0	1 (6)	0	0 (1)	0
	disgust	27 (135)	88 (441)	12 (60)	0 (1)	1 (7)	5 (27)	7 (36)	11 (56)
	interest	3 (14)	0	29 (144)	1 (6)	13 (66)	3 (16)	4 (19)	0
	joy	0	0	3 (16)	93 (465)	0	0	0 (1)	0
	neutral	2 (8)	0	11 (55)	0 (1)	60 (302)	1 (7)	0 (2)	1 (4)
	fear	2 (11)	1 (6)	5 (23)	0	1 (5)	33 (167)	7 (36)	9 (45)
	surprise	1 (3)	0	2 (9)	1 (5)	0	40 (202)	77 (386)	1 (4)
	sadness	6 (29)	7 (34)	12 (59)	1 (3)	10 (51)	9 (47)	1 (3)	73 (365)
	other	10 (49)	2 (10)	22 (112)	4 (19)	12 (62)	7 (34)	3 (16)	5 (26)

Table A.10: The false attribution matrices across the four conditions.

Study 1. Static Body.

STATIC BODY		stimulus							
		anger	disgust	interest	joy	neutral	fear	surprise	sadness
response	anger	56 (281)	4 (20)	6 (30)	0	2 (10)	1 (3)	1 (5)	2 (8)
	disgust	1 (4)	63 (313)	1 (5)	0	0 (1)	0 (2)	0	7 (37)
	interest	9 (46)	1 (7)	62 (310)	0 (2)	5 (24)	2 (11)	0 (1)	4 (22)
	joy	0	0 (1)	0	71 (356)	0	0	7 (33)	0
	neutral	21 (107)	0 (1)	8 (38)	0	81 (406)	0 (1)	0 (1)	6 (32)
	fear	2 (9)	9 (43)	3 (14)	0 (1)	0 (1)	55 (276)	3 (16)	16 (82)
	surprise	2 (11)	1 (6)	12 (58)	27 (137)	1 (3)	37 (184)	88 (439)	12 (61)
	sadness	2 (9)	20 (100)	1 (7)	0 (1)	4 (19)	2 (8)	0 (2)	41 (203)
	other	7 (33)	2 (9)	8 (38)	1 (3)	7 (36)	3 (15)	1 (3)	11 (55)

Table A.11: The false attribution matrices across the four conditions.

Study 1. Dynamic Face.

DYNAMIC FACE		stimulus							
		anger	disgust	interest	joy	neutral	fear	surprise	sadness
response	anger	54 (268)	1 (3)	1 (3)	0 (1)	0 (1)	0 (1)	0	0 (1)
	disgust	25 (127)	78 (389)	7 (33)	0 (1)	1 (3)	10 (51)	3 (15)	3 (17)
	interest	4 (19)	0 (1)	55 (276)	0 (2)	7 (33)	1 (3)	5 (26)	0 (2)
	joy	0 (1)	0	1 (7)	85 (424)	0	0	4 (18)	1 (6)
	neutral	1 (5)	0 (2)	10 (52)	0	76 (380)	0 (2)	0 (1)	1 (5)
	fear	5 (23)	4 (19)	2 (9)	0	0 (1)	62 (308)	6 (32)	6 (32)
	surprise	1 (4)	1 (3)	5 (23)	10 (48)	0	18 (89)	80 (400)	2 (8)
	sadness	4 (21)	14 (71)	2 (9)	0	7 (35)	6 (31)	0 (1)	81 (403)
	other	6 (32)	2 (12)	18 (88)	5 (24)	9 (47)	3 (15)	1 (7)	5 (26)

Table A.12: The false attribution matrices across the four conditions.

Study 1. Dynamic Body.

DYNAMIC BODY		stimuli							
		anger	disgust	interest	joy	neutral	fear	surprise	sadness
response	anger	51 (254)	0 (1)	0 (1)	0	1 (5)	0 (2)	0 (1)	2 (10)
	disgust	2 (9)	61 (307)	0 (1)	0	0	1 (6)	1 (3)	4 (20)
	interest	25 (127)	2 (11)	75 (377)	1 (3)	9 (47)	1 (3)	3 (13)	8 (42)
	joy	0	0	0	62 (309)	0	0 (1)	7 (33)	0
	neutral	6 (30)	0	1 (5)	0	82 (408)	0 (1)	0	5 (26)
	fear	5 (23)	10 (51)	0 (1)	0	0	68 (340)	2 (10)	11 (55)
	surprise	5 (23)	6 (32)	20 (101)	36 (182)	0	26 (131)	86 (429)	13 (64)
	sadness	0 (1)	14 (68)	0	0	2 (8)	0 (2)	0	48 (238)
	other	7 (33)	6 (30)	3 (14)	1 (6)	6 (32)	3 (14)	2 (11)	9 (45)

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PUBLICATIONS

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Dukes, D. (in prep). 12-month olds choose objects previously looked at with interest while 15-month olds choose objects previously looked with disinterest

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