

# Editorial: “Theories and Models” of Emotion

Etienne B. Roesch

**Abstract** Of all work-packages of the HUMAINE Network of Excellence, WP3 “Theories and Models” was probably the most heterogeneous group that one can think of. It was composed of researchers from psychology, cognitive neuroscience, philosophy, ethology and a wide range of disciplines in computer science including neural networks, artificial intelligence and signal processing. We aimed at describing, informing and advising other work-packages of relevant emotion theories and models, as well as scientifically studying emotion, taking advantage of all resources available in HUMAINE.

## 1 Scope of WP3 “Theories and Models”

One of the main challenges faced by whoever seeks to scientifically address emotion – or simply to use emotion theories in a particular (engineering) framework – is to comprehend the variety of emotion theories available. Emotion theories differ greatly with respect to the components they represent and the levels of processing they address. This rather disparate landscape may yield confusion, as not all theories are good for all purposes. Throughout HUMAINE, we used one representation of this landscape in the form of Table 1. This table, taken from Scherer and Peper (2001), represents major theoretical threads and attempts to describe the boundaries for each theory. HUMAINE members were thus able to identify the particular component and the particular level that was most suited for their needs. Most chapters of this book will go back to the theory and model of their choice, and describe how it was applied in their area of expertise; the hope is that reproducing this table here will help the reader to grasp how theories and models relate to each other.

Another big challenge faced by HUMAINE members was the identification of the *transition rules* that allow to pass from one level of conceptualisation to

---

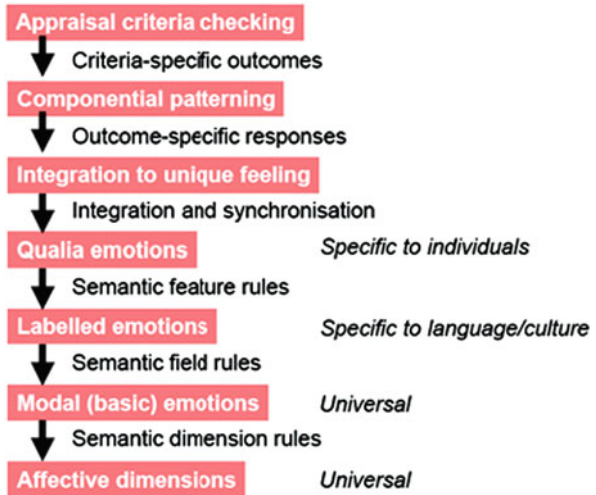
E.B. Roesch (✉)

Centre for Integrative Neuroscience and Neurodynamics, University of Reading, Reading, UK  
e-mail: contact@etienneroesch.ch

**Table 1** Representation of the landscape of emotion theories (Scherer and Peper, 2001)

PHASE COMPONENTS	Low-level evaluation	High-level evaluation	Goal/need priority setting	Examining action alternatives	Behavior preparation	Behavior execution	Communication - Sharing with others
Cognitive							
Physiological	Adaptational models						
Expressive		Appraisal models	Motivational models			Circuit & Discrete Emotion models	
Motivational							Meaning & Construct models
Feeling	Dimensional models						

**Fig. 1** Relations between the levels of representations addressed by emotion theories



the next. Figure 1 illustrates this exercise and introduces some ways to integrate different approaches. For instance, passing from basic emotion theories to a dimensional perspective may be achieved through semantic dimension rules that describe the relationship between the features of modal emotions and the dimensions of affect. The GRID study, for instance, is one attempt to define these transition rules (see Sect. 3.3).

## 2 Outreach Efforts

Throughout HUMAINE, we produced several documents aiming at introducing the network to emotion theories. Each partner had particular goals to achieve, and thus needed answers to particular questions. One of our first goals was thus to establish a dialogue between theory-oriented groups and engineering-oriented groups to identify areas of common interest and means to bridge the gaps. In this section,

we briefly describe some of these outreach efforts. Most of the documents resulting from this dialogue are reproduced on the HUMAINE portal.

### ***2.1 The Proceedings of the First HUMAINE Workshop in Geneva***

WP3 organised the first HUMAINE workshop. It was held in Geneva, from June 17 to 19, 2004. The aim of the workshop was explicitly to bridge the gaps between the many disciplines and individual expertise of HUMAINE, by attempting to create a cohesive affective science research community. This meeting paved the ground for the interactions and collaborations that followed, as reflected in the content of this book. The main achievement was the identification of ways to achieve interdisciplinarity by establishing a common language. The proceedings of the workshop can be found online at this address: <http://emotion-research.net/projects/humaine/ws/wp3/> (last visit: November 14, 2010).

### ***2.2 Definition of Concepts***

One of the first deliverables we produced reviewed some of the most important concepts in the scientific study of emotions and provided pointers to the relevant literature. Significant scientific contributions were extended in journal articles (e.g. Scherer, 2005, and ensuing responses in *Social Science Information*). A whole chapter in this section of the book is dedicated to this topic. More information can be found at <http://emotion-research.net/projects/humaine/deliverables/D3c.pdf> (last visit: November 14, 2010).

### ***2.3 The GRID Study***

One of the main outcome of WP3 has been the GRID instrument, developed to address the semantic profiles of emotion words in different languages (Roesch et al., 2006; Scherer, 2005; Fontaine et al., 2007). This instrument comprehensively gathers 144 features, representing the 6 components explicitly assumed by most current emotion theorists as centrally relevant to the domain of emotion. Applied to three different cultures, we found robust evidence for at least four dimensions to represent the semantic content of emotion words: in order of importance, evaluation–pleasantness, potency–control, activation–arousal and unpredictability (of the occurring event). Whereas the first three dimensions resemble the space suggested half a century ago (Wundt, 1905), the fourth dimension, unpredictability, is not reported in most studies. This latter dimension reflects the urgent reaction to novel stimuli and unfamiliar situations. Of most interest, it renders an explicit continuum differentiating the semantic spaces of surprise, fear and anxiety. More information about the GRID project can be found at <http://www.iccra.net/grid-project> (last visit: November 14, 2010).

## 2.4 *Blueprint for Affective Computing: A Source Book (Oxford University Press, Series in Affective Science)*

One of the main outreach activity of WP3 is the publication of a textbook for all those interested in computational models of emotion based on the state of the art in current scientific investigation of affect in emotion psychology and affective neuroscience (Scherer et al., 2010). Its aim is to present systematic theoretical conceptualisations of the processes underlying emotional reactions and their implications for various fields in applied affective computing. It provides an accessible description of the structures, functions and mechanisms underlying emotional reactions, including processes involved in the elicitation of emotional responses, as well as expressive and physiological responses generated during emotional responses, and interpersonal perception of emotional responses.

## 3 Conclusion

This section of the book gathers chapters representative of the heterogeneity found in WP3. In this respect, WP3 was probably the most extreme case of inter-disciplinary collaborations.

The chapter by Cowie, Sussman and Ben-Ze'ev reviews the concepts used in the scientific study of emotions. In what constitutes a genuine *tour de force*, they identify the commonalities and differences between theories and point at the ambiguities that may confuse someone new to the field. They spell out the features that are proposed by emotion theorists as central in the definition of emotion and attempt to wrap it all together.

The chapter by Marinetti, Moore, Lucas and Parkinson explains the role of emotions in social life. Emotions undeniably play a crucial role in the way social relationships develop and, they argue, cannot be reduced to static entities. Instead, they propose a framework within which can be explained both explicit and implicit emotional reactions in terms of dynamic interactions involving all the components of emotion.

The chapter by Korsten, Roesch, Fragopanagos, Taylor, Grandjean and Sander addresses emotion through the lens of computational neuroscience. They review the current state of the field and spell out the conflicts that arise from the literature, and means to address them.

## References

- Fontaine JRJ, Scherer KR, Roesch EB, Ellsworth PC (2007) The world of emotions is not two-dimensional. *Psycho Sci* 18(12):1050–1057
- Roesch EB, Fontaine JRJ, Scherer KR (2006) The world of emotions is two-dimensional. or is it? In *HUMAINE Summer School*, Genoa, Italy, 2006.  
<http://emotion-research.net/ws/summerschool3/RoeschFontaineScherer-06-Genova.pdf>. Last accessed on 14 November 2010

- Scherer KR (2005) What are emotions? How can they be measured? *Soc Sci Inf* 44(4):695–729
- Scherer KR, Peper M (2001) Psychological theories of emotion and neuropsychological research. In: Gainotti G, (ed). *Handbook of Neuropsychology*, vol 5, 2nd ed. Elsevier, Amsterdam pp 17–49
- Scherer KR, Baenziger T, Roesch EB (eds) (2010) *A blueprint for affective computing*. Oxford University Press, Oxford, UK
- Wundt W (1905) *Grundzüge der physiologischen Psychologie* [Fundamentals of physiological Psychology], 5th edn. Engelmann, Leipzig