



Article scientifique

Article

2022

Published version

Open Access

This is the published version of the publication, made available in accordance with the publisher's policy.

Theory convergence in emotion science is timely and realistic

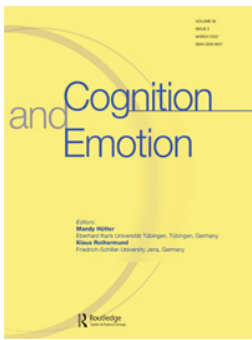
Scherer, Klaus R.

How to cite

SCHERER, Klaus R. Theory convergence in emotion science is timely and realistic. In: Cognition and emotion, 2022, vol. 36, n° 2, p. 154–170. doi: 10.1080/02699931.2021.1973378

This publication URL: <https://archive-ouverte.unige.ch/unige:166129>

Publication DOI: [10.1080/02699931.2021.1973378](https://doi.org/10.1080/02699931.2021.1973378)



Theory convergence in emotion science is timely and realistic

Klaus R. Scherer

To cite this article: Klaus R. Scherer (2022) Theory convergence in emotion science is timely and realistic, *Cognition and Emotion*, 36:2, 154–170, DOI: [10.1080/02699931.2021.1973378](https://doi.org/10.1080/02699931.2021.1973378)

To link to this article: <https://doi.org/10.1080/02699931.2021.1973378>



Published online: 19 Feb 2022.



Submit your article to this journal [↗](#)



Article views: 486



View related articles [↗](#)



View Crossmark data [↗](#)

THEORY SECTION



Preamble

ARTICLE HISTORY Received 31 July 2021; Revised 11 August 2021; Accepted 23 August 2021

This is the inaugural issue of the Theory section in *Cognition and Emotion* (introduced by Rothermund & Koole, 2020). The overall goal is to encourage innovative and generative theoretical efforts that raise and address broad questions about the nature of emotion and its interface with cognition. Approaches that combine and coordinate diverse theoretical elements, and thus facilitate cumulative growth in knowledge about the emotion process, are particularly encouraged (for further details see the Journal's Author Guide). Comments on all articles in the section can be made by authors who are invited by the Section Editor, to foster productive exchange between different theoretical approaches and to highlight the relevance of solid theoretical underpinnings for empirical research efforts in the interdisciplinary domain of emotion research.

The two contributions in this issue reassert the important role of theory in empirical research and argue for a fresh effort by emotion scientists to refine and develop theoretical frameworks that can guide emotion research in the future and allow a higher degree of cumulativeness of research findings. The aim of these first two articles is to pave the way for what is expected to follow, by outlining

some of the major theoretical challenges for research on cognition and emotion. The first article by Klaus Scherer, who is the Associate Editor responsible for the section (Section Editor), proposes a strategy of theory development centred around the notion of theory convergence in the sense of clearly identifying similarities and differences and to establish a constructive discussion about advancing in the sense of complementarity. The second contribution by Rainer Reisenzein, who conceived of the initial idea for the special section (Reisenzein, 2019), argues that more theoretical psychology of emotion is needed and identifies a number of major tasks to be accomplished. Both contributions describe and illustrate potential directions for working towards theoretical progress in the field of emotion research which is the aim of the new section.

References

- Reisenzein, R. (2019). Cognition and emotion: A plea for theory. *Cognition and Emotion*, 33(1), 109–118. <https://doi.org/10.1080/02699931.2019.1568968>
- Rothermund, K., & Koole, S. L. (2020). Rethinking emotion science: New theory section. *Cognition & Emotion*, 34(4), 628–632. <https://doi.org/10.1080/02699931.2020.1775924>



Theory convergence in emotion science is timely and realistic

Klaus R. Scherer  ^{a,b}

^aUniversity of Geneva, Geneva, Switzerland; ^bLudwig-Maximilians-University, Munich, Germany

ABSTRACT

Over the last century, emotion research has been beset by the problem of major disagreements with respect to the definition of the phenomenon and an abundance of different theories. Arguably, these divergences have had adverse effects on theory development, on the theoretical foundations of empirical research, and on knowledge accumulation in the study of emotion. Similar problems have been encountered in other areas of behavioural science. Increasingly, there have been calls to work towards some form of theory integration. In contrast, here an effort is made to show that a reasonable degree of *theory convergence* in the area of emotion science can be attained by adopting a design feature-based working definition of emotion and highlighting the basic agreement on the components of the dynamic emotion process. The aim is to invite constructive discussion on communalities and divergences between different theories and foster the development of more complementary theoretical frameworks to guide future empirical research.

ARTICLE HISTORY

Received 31 July 2021

Revised 11 August 2021

Accepted 23 August 2021

KEYWORDS

Emotion theories; emotion definition; theory convergence; emotion components; emotion process

How shall a thing be called? In 1958, Roger Brown tried to answer the question: “What determines the name given to a child for a thing?” His answer was “Things are first named so as to categorise them in the most useful way.” (Brown, 1958a) and extended the exploration in his pioneering book “Words and Things” (Brown, 1958b). In emotion psychology, we have the opposite problem. We have a name, “emotion”, but disagree about the thing. What is an emotion? This conundrum has haunted emotion psychology from the times of William James until today. Trouble is that we need to find an answer, even if it falls short of a bona fide essentialist definition, to be able to agree on appropriate theories of emotion, a never-ending quest in this domain. It may be partly due to what Walter Mischel has called the *toothbrush problem*: “Psychologists treat other peoples’ theories like toothbrushes — no self-respecting person wants to use anyone else’s” (Mischel, 2008; see Gigerenzer, 2017, p. 134). Arguably, this problem is quite frequently encountered in emotion psychology. There are probably many reasons for this problem. One possible explanation is that theories diverge

because the (implicit) definitions of emotion of their authors diverge.

Overview

The aim of this article is to examine three major types of emotion theory (basic/discrete emotion theories, constructionist theories, and appraisal theories) in terms of their conceptualisation of the central components of the emotion process, trying to identify similarities and evaluating the importance of the divergences, which have often been overemphasised in the literature. To this purpose, a dynamic model of the emotion process is proposed and compared to the central claims of the different theory families, particularly with respect to the components and subprocesses that are particularly highlighted by the respective theories. The assumption is that by a better understanding of the compatibility of the major theories constructive discussion can be facilitated, encouraging the design of critical empirical studies to examine the proposed mechanisms.

First, some recently published proposals for theory convergence (moving towards greater coherence) or even theory integration (combining theories) will be presented, with a special emphasis on the thorny issue of a consensual definition of the phenomenon. Using a recursive process model based on a number of central components postulated by most theorists, a flexible design-feature approach to allow defining the phenomenon is proposed. In the next step, the issue of comparing the mechanisms of the sequence and interaction of the components is addressed by briefly highlighting the specific postulates of the three major theories and the degree of compatibility. Finally, a number of concrete suggestions of promoting convergence in the interest of creating a constructive framework for empirical research are suggested.

Defining “emotion”

In a programmatic article, Gigerenzer (2017) has addressed the problem of theoretical hygiene by working towards the *integration* or at least the *convergence* of already existing theories. Gigerenzer argues that working towards this aim requires formalisation and close attention to operational and conceptual definitions, which takes us back to the “thing” called emotion.

William James suggested in 1884 “that the bodily changes follow directly the perception of the exciting fact, and that our feeling of the same changes as they occur *is* the emotion” (James, 1884/1969). Ellsworth (1994) has pointed out that this claim, and the reaction by Cannon (1927), led to a century of debate, which is still not settled. This problem might not have arisen if James had not exclusively focused on “directly following bodily changes”. Ten years later, in response to his critics, he said that the nature of the bodily changes was determined by the “overwhelming idea” of the significance of an event (James, 1894, p. 518). This sounds very much like appraisal. He further asks (p. 525): “For which sort of feeling is the word ‘emotion’ the more proper name – for the organic feeling which gives the rank character of commotion to the excitement, or for that more primary pleasure or displeasure in the object, or in the thought of it, to which commotion and excitement do not belong?” Most modern theorists are likely to respond: “All of these!” The definitional miasma is still further complicated by terms such as “affect”, “emotional experience”, and even “mood”, which are often used interchangeably with “feeling” and

“emotion”. Thus, a clarification of what different emotion theorists exactly mean when they use the term “emotion” would greatly facilitate any attempt at theory convergence. This definitional issue is particularly important with respect to research on the etiology of emotional disorders in clinical psychology and psychiatry. The debate about the diagnostic criteria for depression in the DSM-5 has clearly demonstrated the importance of agreeing on what normal emotion processes are in order to agree on the diagnosis of abnormality or disorder (see the contributions in the special issue of Emotion Review on this burning issue, Scherer & Mehu, 2015).

Most past attempts to define “emotion” have been guided by words considered as “emotion labels” ranging from the often quoted “basic six” to the total number of emotion terms in a language. One major problem is that the many languages in the world differ in the number of emotion terms and the degree of differentiation of the emotion domain. While there is a remarkable degree of agreement for most of these terms there are also major differences (see the case studies in Fontaine et al., 2013, an investigation of the semantic structures of 24 emotion terms in over 20 different languages). An even more fundamental problem arises when the implicit definition of emotion seems to require conceptualisation (or even verbal labelling) of the respective feeling state. This would be strongly disputed by many scholars in the area of emotion studies, especially as it precludes a systematic approach to infant and nonhuman emotions.

The following passage from an essay on nostalgia by Jacques Starobinski, a Swiss psychiatrist and historian of literature, nicely illustrates this point:

Emotions come before the words that name them. Emotions only exist for our consciousness after they receive a name. These two propositions contradict one another and are equally true. We know that they are also true for the names of colors. Despite looking the same, an emotion, once named, is no longer exactly the same. A new word brings together the unknown, which before had no form. Being named makes it a concept, it has a definition, and it calls forth an additional definition: it becomes a material for tests and experiments. The name of an affective state, if it is adopted and put into circulation, not only propagates itself in the vocabulary, it produces new emotions. We live passions whose words precede us and which we would not have felt without them. ‘There are people who would never have been in love, if they hadn’t heard of love,’ writes de la Rochefoucauld (1678). This is primarily the effect of fashion or cliché, a thread of singular

influences, a more-or-less conscious process of literary borrowing. Diffusion and generalization follow: each group, each society, sees, at a given moment, the call of several words reverberate almost without end, in a process which doesn't differ greatly from that of learning a language. (Starobinski, 2003/2013, p. 329)

In consequence, conceptualisation and verbal labelling, even though they may occur quite frequently in emotion episodes, cannot be considered as the unique basis for the definition of emotion. Another reason for not defining emotion via specific instantiations characterised by a single lexical label is the frequent occurrence of blended or mixed emotions. In studies in which large groups of participants reported emotional events that they experienced recently and in which they could choose their own labels (Scherer et al., 2004) or had a choice of using one or two labels (Scherer & Meuleman, 2013), a very high percentage of the reported emotional experiences was described by more than one label, presumably representing mixed (simultaneously or sequentially occurring) emotions. These studies also found that certain emotion blends occur much more frequently than others do (see also Cowen & Keltner, 2017; Larsen, Coles, & Jordan, 2017; Larsen & McGraw, 2011).

Expanding on Gigerenzer's (2017) insistence on the need for rigorous definitions, Hibberd (2019) cites frequently encountered observations in the emotion literature (e.g. Maul, 2017, Mulligan & Scherer, 2012, Rossiter, 2017) that "the concept in question has either suffered under the weight of a plethora of definitions, has not been defined consistently, has not been defined without ambiguity, has not been defined at all, or that there is a mismatch between the conceptual definition and its operationalization" (p. 29-30). However, she takes issue with Gigerenzer's endorsement of "operational definitions", arguing: "In short, the relations or connections that K [a "kind of thing"] is involved in, tell us nothing about what it is to be K. In particular, the pervasive, singular presence of the operational definition in psychology since the 1930s has many treating the words "operationalize" and "define" as synonymous when, in fact, to operationalise is not to define at all, nor can it be. Operationalism is not coherent and procedurism is not definition. Regardless of whether psychologists operationally define their variables or merely engage in the necessary procedurism, neither scenario provides anything approaching scientific definition" (p. 48).

What, then, is a *scientific definition*?

According to realist philosophers, it "consists of a description of the kind's essential or defining features – to describe what it is in virtue of that makes kind X. Essential or defining features are the characteristics or features or conditions without which that kind could not be the kind it is, i.e. the kind has them necessarily. It is, then, the mark of any real genuine kind, such as a particular kind of behaviour or cognitive process, that something identical – some set of common features – necessarily runs through all of its instantiations (Hibberd, 2019, p. 32)

This standard, essentialist account of the requirements for a scientific definition is of course a tall order, which explains why some philosophers of science have proposed more flexible versions of the essentialist account. In particular, Hibberd mentions the Homeostatic Property Cluster (HPC) account, proposed by Boyd (1999, 2010) to account for the vague and sometimes changing boundaries for many kinds of phenomena. The "core thesis is that some kinds are defined by a cluster of features that regularly but not exceptionlessly co-occur; and a set of factors (causal homeostatic mechanisms) that maintain their systematic co-instantiation or clustering, factors that provide some necessary cohesiveness or stability to the cluster". One possibility to solve the problem of incomplete co-instantiations is to introduce a "polythetic" definition in terms of disjunctive subtypes (Hibberd, 2019, p. 39-44). Hibberd suggests that this is not a genuine alternative to the basic essentialist account but that it may help to pave the way to reach a true scientific (essentialist) definition.

What is the relevance of this discussion for the definition of emotion? Many emotion theorists are skeptical about the chances to arrive at a consensual definition of the phenomenon. However, Hibberd's proposal may show a way to at least arrive at a *working definition*, a (more or less) consensual framework for defining the term that serves to identify a sizeable interdisciplinary research area. Concretely, the proposal here is to use *emotion* as a major superordinate category to be defined by an HPC cluster – emotion as a polythetic concept or "kind" (allowing for disjunctive subtypes) – characterised by a number of features represented by the component structure of the emotion process postulated by the majority of emotion theorists. Figure 1 (adapted from Scherer, 2021) shows an example of the structure of a recursive emotion process and its major components.

In this model, emotion is conceptualised as a process of synchronisation of multiple components

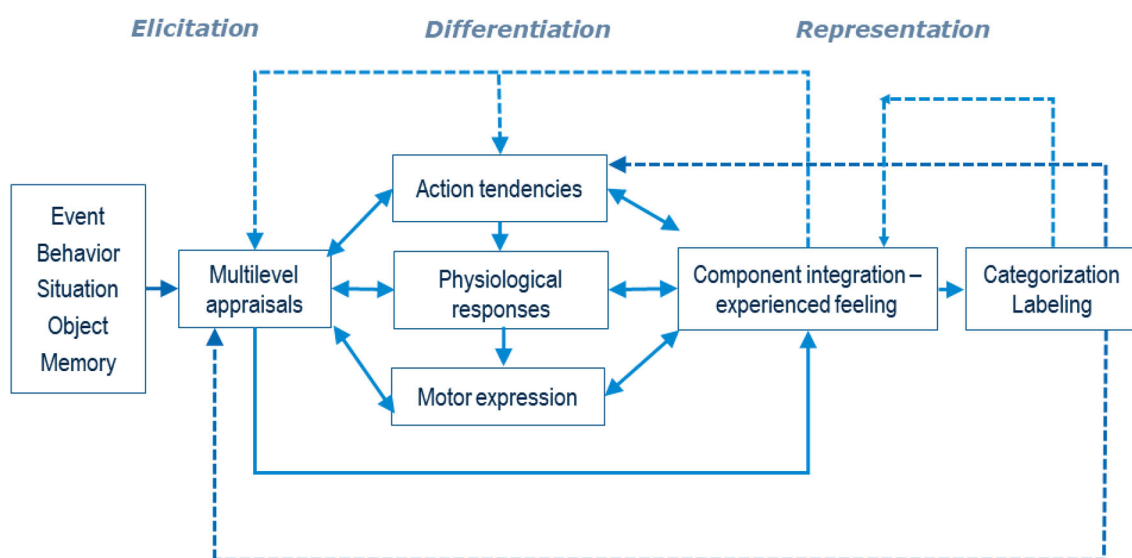


Figure 1. General model of the architecture of the emotion process: Recursive interactions between components in the emotion process. (Adapted from Figure 1 in Scherer, 2021). Note: dotted line – weak effect; solid line – strong effect; double arrowhead – recursive effect.

through recursive causal relationships (Scherer, 1984, 2001, 2005, 2009). The emotion episode is recursive (involving the repeated application of a procedure to successive results) because the outcome of the emotion process is determined by a succession of processing cycles in which information is successively added to allow continuous re-evaluation. For example, if one suffers a loss (a goal obstructive event), the immediate action tendency is likely to be aggression with the appropriate ANS and SNS

activation pattern. If, in the next cycle, one remembers that the loss is due to a blunder, due to one's own agency, the evaluation and the action tendency changes. This operation is carried on until closure is achieved according to variable criteria. In Figure 1, recursiveness is signaled by dual arrowheads in lines indicating the most likely cases of continuous re-evaluation. In a similar vein, Lange and collaborators have recently presented a psychometric network model in which emotions are conceptualised as

Table 1. Design feature delimitation of different affective states/dispositions.

Types of affective states/dispositions: (examples in parentheses)	Emotions (e.g. angry, sad, joyful, fearful, ashamed, proud, elated, awestruck, desperate)	Moods (e.g. cheerful, gloomy, irritable, listless, depressed, buoyant)	Affective interpersonal stances (e.g. distant, cold, warm, supportive, contemptuous)	Attitudes (e.g. liking, loving, hating, valuing, desiring)	Affective personality dispositions (e.g. nervous, anxious, reckless, morose, hostile, envious, jealous)
Event focus	+++	+ → ++	+	0	0
Appraisal elicitation	+++	+	+	+	0
Action tendencies	+ → +++	+	++	+	+
Physiological responses	+ → +++	+	0 → ++	0 → +	0 → +
Motor Expression	+ → +++	+	0 → ++	0 → ++	0 → +
Component synchronisation	++ → +++	+	+	0	0
Feeling	+++	+ → ++	+ → ++	+ → ++	0
Verbalization	0 → ++	0 → +++	0 → ++	0 → +	0 → +
Intensity	++ → +++	+ → ++	+ → ++	0 → ++	0 → +
Duration	+	++	+ → +++	++ → +++	+++
Rapidity of change	+++	+ → ++	+	0 → +	0
Regulation potential	+ → ++	+ → ++	+	0 → ++	0

Note: Occurrence/Strength: xxx often/strong, xx sometimes/medium, x rarely/weak, 0 never/absent; → range

systems of causally interacting emotion components (Lange et al., 2020; Lange & Zickfeld, 2021).

Table 1 (adapted from Table 6.1 in Scherer, 2000b) shows a hypothetical variation of Hibberd's illustration of an HPC cluster to formally define emotion as a process of component interaction. This grid-like format to characterise the major features of a central concept is very similar to Kelly's repertory grid (Bell, 2003), Hockett's design features of language (Hockett & Hockett, 1960), and the GRID semantic feature analysis (Fontaine et al., 2007; Fontaine et al., 2013; Scherer, 2005a). The cluster features are different typical qualities and components of emotion (such experience, expression, appraisal, physiology) many of which have been postulated by major emotion theorists (e.g. Averill, 1980, 1997; Clore & Ortony, 2008, Ekman, 1984, 1992, 2004; Ellsworth, 2013; Ellsworth & Scherer, 2003; Frijda, 1987, 2007, 2009; Izard, 1992, 2007, 2009, 2010; Keltner & Haidt, 1999; Keltner et al., 2019b; Kuppens et al., 2009; Kuppens & Verduyn, 2017; Lange et al., 2020; Lange & Zickfeld, 2021; Lazarus, 1996, 2006; Mandler, 1990; Moors, 2013, 2014, 2017; Mauss et al., 2005; Moors et al., 2013; Oatley & Johnson-Laird, 2014; Reisenzein, 2000; Reisenzein & Hofmann, 1993; Roseman, 2001; Roseman & Evdokas, 2004; Russell, 2003, 2009; Scherer, 1984, 2000a, 2001, 2009a, 2009b; Scherer & Moors, 2019; Smith, 1989; Smith & Ellsworth, 1985; Smith & Lazarus, 1993; Shuman et al., 2017; Wierzbicka, 1993). Additional features/components of emotion have been suggested in the literature including regulation (Parrott, 2007) or enaction (Colombetti, 2014). Thus, the phenomena proposed for consideration as elements of the cluster are affective phenomena that may be considered as potentially subsumable under a scientific definition of the "emotion kind".

It is important to note that in the case of emotion most features/components are always present, in other words, the person always has ongoing cognitive processes, physiological states, and motor activation, even if they are minimal. Therefore, the mark of an *emotion episode* is not the presence/absence of a component feature, as is the case for many other kinds, but the degree to which it is activated above baseline, when a specific subtype of emotion occurs. Further, in contrast to other cases of definitions of natural kinds, the component features are not independent of each other but interrelated by complex dynamic processes that involve synchronisation of sub-processes and recursiveness. The importance of the dynamic nature of emotion has been often

neglected in the literature (but see Colombetti, 2014; Fogel et al., 1992; Grandjean et al., 2008; Grandjean & Scherer, 2008; Kuppens & Verduyn, 2017; Lewis, 2005; Sander et al., 2005, 2018; Scherer, 2000a, 2009a, 2009b, 2019; Sheppes & Gross, 2011).

The entries in **Table 1** are meant as illustrative examples; they require further elaboration and, most importantly, discussion between emotion theorists. The point is that the acceptance of a common definitional framework might effectively serve to increase agreement on the challenging issue of defining the nature of emotion (see also Turner & Ortony, 1992). Given the wide acceptance of the componential approach to episodic emotion processes, this does not seem too unrealistic. What is required, however, is a concerted common effort to collect all features/components that are considered as essential, or at least somewhat typical for different emotions, as well as their interrelations, and decide on the criteria for defining disjunctive subtypes (Hibberd, 2019, p. 39-44). This effort is timely as there is a growing number of studies that subsume affective states outside of the usual canon, such as sexual desire or romance (Cowen & Keltner, 2017), under the heading of emotion. One possibility of advancing on this task is to identify and agree upon more or less coherent profiles in **Table 1**.

Once having reached a reasonably satisfactory solution for a polythetic emotion definition, efforts towards theory convergence can seriously be undertaken (at least for theories that adopt the polythetic definition). In his programmatic proposal, Gigerenzer (2017) postulates two analytical stages of this process: 1) the identification, integration and differentiation of *phenomena* and 2) identification, integration and differentiation of *concepts* with a special emphasis on the analysis of *functional equivalence* of concepts. Gigerenzer (2017) provides detailed examples of the procedures he proposes to carry out these tasks, using examples from decision research. Interested readers are invited to consult the article. Here only a modest attempt will be made to apply the suggested heuristics to some issues in emotion theory.

The first stage concerns the definition of the phenomenon, the central object of study. The discussion of the definitional issues just above provides an appropriate entry point. An integration or convergence of concepts and theories can only occur when there is a certain amount of agreement on the phenomena at stake. In other words, theorists need

to agree at least on a working definition of the thing called emotion. Some of this integration might be achieved by discussing the meaning of the labels used by different theorists, or indeed, by a reasonable dose of operational definition. Or, if there is no agreement on a common definition, one could at least attempt to differentiate major subtypes of emotion and limit one's theory to the respective disjunctive subtype. This, in itself, would be a major advance in our understanding of the theoretical aims pursued by certain theorists.

As to the integration or dissociation of phenomena, this raises the thorny issue of synonyms or near-synonyms – should we integrate indignation, irritation, ire, annoyance, outrage, exasperation, rage, fury etc. under the classic anger class or dissociate several subclusters? To solve this problem, it might be helpful to abandon the idea that a single word can be used to label a particular type of emotion and accepting that emotion types are often fuzzy sets with many subtle shades of meaning for which certain languages may have coined different words. In this context, several authors have suggested the concept of emotion families (e.g. Ekman, 1992, 2004; Roseman, 1994). This approach could also accommodate the important phenomenon of the frequent occurrence of blended or mixed emotions. One possible criterion would be the number of feature components that need to be added to allow dissociation. Much depends on the extent to which one wants to consider folk concepts in this exercise (see Reisenzein, *in press*). If this is considered relevant, given that words in a specific language do in fact represent folk concepts, one might turn to cluster analysis based on sorting tasks (Hosoya et al., 2017; Shaver et al., 1987, Shiota & Keltner, 2005) or GRID feature analysis (Beermann et al., 2021) as one source of information.

Convergence of concepts and proposed mechanisms

Stage 2 of Gigerenzer's proposal concerns the integration and differentiation of concepts and the analysis of their functional equivalence. For decision theory, Gigerenzer illustrates this stage by demonstrating that four different types of decision trees use the functionally equivalent concepts of "decision criterion" and "exit structure". Similarly, in his article in the current issue Reisenzein postulates the systematization and integration of emotion theories that share

common elements by examining to what extent they are functionally equivalent. These appeals do not ask for a unification or integration at all cost, but rather for a detailed analysis of where common elements or functional equivalence may allow some degree of convergence of different theories.

Similarly, in the domain of personality psychology, including emotional disorders, Matthews (2020) warns against striving for a consensual paradigm for all personality trait research so long as major theories utilise constructs at different levels of explanation. He argues that the prospects for an integrated personality trait theory depend on the scope for integrating constructs across and within levels. In the meantime, in the spirit of *explanatory pluralism*, a position that accepts disunity in personality theory, he suggests a Cognitive-Adaptive Theory of Traits (CATT) that provides a conceptual framework inter-relating theories at different levels.

In the same spirit – accepting the existence of explanatory pluralism but striving, as much as possible, for theoretical integration – Reisenzein (*in press*) enumerates a series of major tasks for emotion theorists: (1) Analysis, rational reconstruction and critique of existing emotion theories. (2) Comparison of different theories. (3) Systematization and integration of theories. (4) Reconstruction of the development of theories over time. (5) Analysis, reconstruction and critique of theory-data and data-theory inferences. (6) Analysis, reconstruction and critique of the complete set of arguments for and against specific emotion-theoretic assumption and whole theories. (7) Analysis, reconstruction and critique of measurement theories for emotions. (8) Development of new emotion theories and theories of emotion measurement. (9) Increased exchange about theories and methods with other fields.

Bringing about a certain degree of convergence of different emotion theories implies to first identify these theories and their claims. This in itself is a daunting task, given the large number such theories in the different disciplines studying emotion (see Izard, 2009; Scarantino & de Sousa, 2021; Scherer, 2000b; Scherer & Peper, 2001). Here, three types or classes of *psychological* theories that are arguably most frequently discussed in the current literature will be briefly discussed: basic/discrete emotion theories, appraisal theories, and constructionist theories. This is not the place to provide a detailed review – rather the purpose of the current proposal is to investigate the potential points of convergence between these,

supposedly incompatible, classes of theories. In other words, using Mischel's metaphor cited at the outset, to examine the respective toothbrushes to decide on the degree of unpalatability.

In the emotion literature, these theories are often described in a simplified, rather stereotypical fashion, as the following examples show:

- Basic emotion theory: Focusing on the specificity of a small group of emotions (6-10), considered as evolutionarily continuous and culturally comparable, elicited by innate affect programmes that produce characteristic patterns of facial expressions.
- Appraisal theories: A cognitivist approach defining discrete emotions as the result of certain configurations of evaluative judgments of events.
- Constructivist theories: Presuming that each individual constructs a subjective label to conceptualise a core affect defined by a position in a two-dimensional valence x arousal space.

Needless to say, these are caricatures of the current state of these theories. Here we already encounter one serious obstacle for theory convergence in emotion science: Theories are rarely discussed in their current, most advanced versions, rather they are often greatly simplified, the enormous complexity of both explicit and implicit assumptions is rarely considered, and important differences between theorists classified under one of these labels neglected. To take but one obvious example, the major protagonists of the "basic emotion" theories have not intended to use the notion of "affect programs" to refer to simple push-button mechanisms or rigid stimulus-response (S-R) links, but rather as a metaphor for universal elicitors and supporting patterns of neurophysiology and expression. In addition, they have considerably developed the theoretical complexity of their position over many years (see Scherer & Ellgring, 2007, p. 114).

Thus, as suggested by Gigerenzer (2017), Matthews (2020) and Reisenzein (*in press*), the theories to be compared for achieving convergence or at least constructive (temporary) co-existence, first need to be thoroughly analysed and disambiguated. One approach to start this process is to examine on which essential points theorists really disagree. One way of doing this is to take a model of the emotion process that corresponds best to majority view of how the emotion process unfolds. Take the model

in Figure 1, which contains many of the assumptions in theories of widely different origins. It can be argued that many theorists may not be fundamentally opposed to this general model but *may differ in terms of what they consider the most essential elements in this process*. Some of the particular preoccupations of different theories are shown in Table 2 (adapted from Table 6.2 in Scherer, 2000b; see also Moors, 2017). Given this important qualification, one way to advance the theoretical debate, is to ask which theorists would categorically deny the operation of any of the elements in the process model shown in the figure.

Basic emotion theorists have highlighted a small number of discrete, frequently occurring emotions that are considered as basic because of an evolutionary prefiguration of prototypical elicitation conditions and response profiles. As shown in Table 2, researchers working in this research tradition have been mostly concerned with the identification of response profiles, in particular facial and vocal expressions and to some extent, physiological reaction patterns. As to the elicitation of emotions, Ekman (1984, 2004) has proposed that basic emotions can be evoked by both rapid "automatic appraisals" of prototypical situations, and by more cognitively complex "extended appraisals" of non-prototypical events. Most theorists in the basic emotion tradition also agree on that one component of emotions is a characteristic feeling that has motivational and informational functions, and that may or may not be conscious or verbally labelled (e.g. Izard, 2010). They also agree that there are many more emotions beyond the basic emotions (as mentioned above, Ekman, 1992, also postulates emotion families); and they allow for individual and cultural differences. In any case, the role of cross-species and cross-culture similarities and differences can be empirically ascertained and should not be considered a defining feature of basic emotion theory. In consequence, it is unlikely that basic emotion theorists would strongly oppose the proposed feature analysis for a consensual emotion definition and should thus be open to attempts at theory convergence along these lines.

Appraisal theorists have focused on the evaluation of the significance of events for the person's goals and preferences as well as taking into account appraisal dispositions (or biases) and cognitive abilities. They suggest that the nature of the respective emotional experience depends on the outcomes of multidimensional appraisal processes, which involve, in a

Table 2. Differential foci of different psychological theories of emotion.

Theories	Major focus	Elicitation mechanism	Differentiation mechanism
Basic emotion theories	Motor expression and adaptive behaviour patterns	Prototypical situations or stimulus configurations	Phylogenetically continuous neuro-anatomical circuits or motor programmes
Appraisal theories	Link between emotion-antecedent evaluation and differentiated reaction patterns	Appraisal mechanism based on a universally valid set of criteria, influenced by cultural and individual differences	Adaptive reactions in motor expression, and physiological responses in response to appraisal results and the action tendencies generated by the latter
Constructivist theories	Subjective feeling (valence, arousal) Verbal conceptualisation of subjective feeling	Basic approach-avoidance tendencies; interaction between components, individual and cultural differences in interpretation patterns	Spontaneous conceptualizations of perceived component changes Socially shared, prototypical mental representations

recursive fashion, several central checks or criteria. As pointed out early on by Ellsworth and Scherer (2003), the different appraisal theories, based on pioneering proposals by Arnold (1960) and Lazarus (1996, 2006) are quite comparable. As shown in Table 2, all appraisal theorists consider the evaluation component to represent the core of the emotion process that determines changes in all other components and their interactions. The theoretical predictions of appraisal theory have been tested in a large number of empirical studies over the past three decades, comprising a large number of studies on verbal reports of emotional experiences (e.g. Reisenzein & Hofmann, 1993, Roseman & Evdokas, 2004; Scherer, 1997a, 1997b; Scherer & Meuleman, 2013; Smith & Ellsworth, 1985), physiological reactions (e.g. Gentsch et al., 2020; Kreibitz, 2010; Smith, 1989), and facial and vocal expression (e.g. Scherer et al., 2018). More recently, the neural mechanisms underlying the appraisal process have become the object of empirical research (Brosch & Sander, 2013; Gentsch et al., 2015, 2020; Grandjean & Scherer, 2008; Guex et al., 2020; Leitão et al., 2020; Mohammadi et al., 2019; Sander et al., 2018; Scherer, 2012).

Theorists in the appraisal tradition so far have not dealt very intensively with the process of categorisation and verbal labelling of emotional experience. Following a suggestion concerning the use of design feature analysis of emotion words (Scherer, 2005a), there have been a number of studies on the meaning structure of emotion words in different languages (Fontaine et al., 2007, 2013). Appraisal theorists would argue that if categorisation of the emotional experience occurs (which need not be the case), it will usually be in terms of an emotion label, given that the whole process with all its components is an instance of an emotion episode. The self-ascription of emotion labels is based on a process of feature profile matching that uses the

appraisal pattern and associated action tendency as well as the nonverbal feeling.

Recently, Moors (2014, 2017) has distinguished between several “flavors” of appraisal theory based in particular on the role different theorists ascribe to discrete emotions vs. more open, cumulative emotion processes. However, because this issue is not prejudged by the component model shown in Figure 1, most appraisal theorists should have little difficulty of joining a theory convergence attempt based on this model.

As to constructivist (or constructionist) theories of appraisal, there are also several types. Early on, Averill (1980, 1997) suggested that emotions should be defined as socially constituted syndromes or transitory social roles. This approach has been developed by social functional theories (Keltner & Haidt, 1999). Mandler’s (1990) constructivist theory emphasises the role of discrepancies and interruptions as a major source of autonomic nervous system arousal and emotional intensity, highlighting the role of cognitive schemata determining the quality of emotional experience.

A second brand of constructivist theories is based on the dimensional model of emotions pioneered by Wundt (1897). Russell’s (2003) constructionist theory opposes the notion of fixed mechanisms for a small set of basic emotions, arguing that each instance of an emotional episode (prototypical or not) is psychologically constructed on the occasion of its occurrence and that no mechanism is required to explain the packaging of the different components into a whole (p. 166-167). More specifically, Russell proposed that events produce a change in *core affect*, defined as “neurophysiological state consciously accessible as the simplest raw (nonreflective) feelings evident in moods and emotions” that can be described as two-dimensional space formed by pleasure/displeasure and activation/deactivation (Russell,

2003, p. 148). Arguably, this corresponds to the emotional experience/feeling component shown in the model in Figure 1. However, all other components shown in Figure 1 are also part of Russell's proposal. The difference is that according to Russell, core affect is directly caused by the perceived "affective quality" of the antecedent event and is then attributed to the event and appraised on similar criteria as those postulated by appraisal theorists. The perception of affective quality in terms of valence is very similar to the appraisal of "intrinsic pleasantness" proposed by Scherer (1984, 2009a) as one of the earliest parts of the typical appraisal sequence (likely to be processed on a sensorimotor or schematic level of processing; Leventhal & Scherer, 1987; van Reekum & Scherer, 1997). The other components of the emotion episode are, according to Russell, instrumental action, physiological reactions, and motor expressions. To this, Russell adds a component of subjective conscious experience that is based on "metacognitive judgments" (which can also be considered as corresponding to the emotional experience/feeling component in the model in Figure 1).

Finally, there is the concept of "emotional meta-experiences" which seems to correspond to the categorisation/verbal labelling component in Figure 1. Russell proposes that categorization is based on the "resemblance between a pattern of components and a cognitive prototype for an emotion". This mechanism, too, is similar to corresponding proposals by appraisal theorists. For example, Scherer (1984, p. 311; 2005a, p. 707) has argued that there are as many different emotional experiences as there are possible combinations of appraisal outcomes and their consequences and that emotion labelling is determined by the component feature profiles that correspond to particular emotion labels in different languages (Scherer, 2005; Fontaine et al., 2013; see also Moors, 2014). In most languages, some emotion categories and labels are used much more frequently than others, suggesting the possibility that they connote universal basic emotions. However, Scherer (1994) has proposed to use the more neutral term "modal emotions" for these emotions, leaving it up to further research to identify the reasons why labels for these emotions are used so frequently (see also Moors, 2017).

As to the dimensions of the feeling component there is a difference – in addition to valence and arousal, as proposed by Russell for core affect, Fontaine and collaborators report empirical findings

showing that two more dimensions are needed (power and novelty) to adequately represent the degree of differentiation of emotional experiences (Beermann et al., 2021; Fontaine et al., 2007, 2013). This work also revealed that, in several studies, the power dimension is the second most important factor in terms of variance explained, preceding arousal. Similarly, Cowen and Keltner (2021) report, based on large scale, computational work, that what appears to be primary are distinct emotions and not valence and arousal in dimensional analyses and that the latter do not correlate strongly across cultures.

It could be objected that these empirical studies are mostly based on the meaning of verbal emotion labels whereas Russell (2003, p. 148) conceptualises core affect as "the simplest raw (nonreflective) feelings that enter consciousness". The problem is that these raw feelings are unlikely to be accessible to introspection, and thus to dimensional analysis of empirical data. Russell's (1980) claim for two-dimensionality (valence and arousal) is mostly based on earlier research, much of which also used verbal labels (and sometimes, facial expressions; Smith & Ellsworth, 1985, p. 814-5) in factor analyses for emotional experiences. Russell and Barrett (1999, p. 807) explained that they consider core affect exclusively as the non-conceptual component of emotion (to which they apply the two-dimensional "circumplex" model based on dimensional analyses of verbal emotion labels). However, no empirical validation for a two-factor structure of this primitive, non-conceptual feeling state is reported. Given the demonstrated importance of the power dimension for the conceptual mapping of emotion terms in many different languages, it is difficult to see how it could emerge from a simpler two-dimensional valence-arousal space (especially as it frequently explains more variance than arousal).

However, this difference is unlikely to prevent theory convergence, as the dimensionality of core affect (or raw non-conceptual feeling or experience) does not seem to have a major bearing on theoretical predictions. Furthermore, it might be possible to agree on a somewhat richer implicit dimensional structure for this nonverbal component. It could be argued that if core affect is at the basis of a more elaborate construction process, it would be useful to have a representation of the power or coping potential dimension and possibly, especially for epistemological and aesthetic emotions, of novelty and

engagement. In any case, this question constitutes an interesting issue for further empirical research.

Barrett's (2017) more recent "theory of constructed emotion" (formerly "conceptual act model of emotion") relies principally on a neurocognitive approach, arguing that "The brain continually constructs concepts and creates categories to identify what the sensory inputs are, infers a causal explanation for what caused them, and drives action plans for what to do about them. When the internal model creates an emotion concept, the eventual categorization results in an instance of emotion." (p. 13). Apart from the last sentence, Barrett's proposal is close to the assumptions of appraisal theorists (and most other emotion scientists) who, of course, also consider the brain as the place where complex evaluation processes and action planning, as well as categorisation and verbal labelling of the emotional experience unfold (see also Parrott, 2007). However, it is not obvious whether this constructivist theory relying somewhat holistically on the brain as an agent constitutes the stringent theoretical framework that Gigerenzer (2017) requires to guide the generation and empirical evaluation of pertinent hypotheses.

In general, the trouble with the word "construction" is that it can be interpreted in many different ways. The most common one these days is of course the construction of a building according to preexisting architectural concept or blueprint, implying the existence of an actor, a volitional act and a previously defined end state. The notion of a "conceptual act model of emotion", that is, the categorisation of a pleasure-arousal patterns by an emotion concept which creates the emotion, which is evoked by this interpretation, is not shared by most other emotion theorists. A different interpretation of the term "construction" is based on the etymology of the original Latin "con-struere" – "to pile up together, accumulate; build, make, erect" (<https://www.etymonline.com/word/construction>), implying a cumulative process of building up from components. This is arguably what Averill, Mandler and Russell meant by a constructivist or constructionist model. Notably, this etymological interpretation also corresponds quite closely to the cumulative, recursive model shown in Figure 1.

This rapid survey suggests that there are fewer unsurmountable ideological differences between the theories compared here than is often claimed. In most cases, the existing differences seem to be due

to the use of different terminology (e.g. construction, basic, discrete, affect, experience), on the respective level of analysis (e.g. brain, behaviour, language), and, in particular, on unequal emphasis placed on specific components and stages of the emotion process (as shown in Table 2).

To sum up – Arguably all major emotion theorists assume that emotions 1) consist of an episodic process in response to a perceived event or situation of major significance, 2) which is characterised by recursive causal effects (forward and backwards) between several components that include the evaluation of the event in terms of its significance for the goals and values of the individual, 3) creating physiological reactions, motor expressions, and action tendencies and 4) that this process is partially accessible to consciousness, resulting in feelings that 5) can be categorised and subsequently labelled by the individual in terms of its subjective conceptual structure. If this is indeed the case, it makes little sense to hamper progress in theoretical development by fruitless debates between different schools historically labelled by certain components or parts of the emotion process that were the focal concerns of the respective school at its origin. Currently, no "basic emotion theorist" would deny the existence of many other emotions in addition to a small number of prototypical emotions, no "appraisal theorist" would focus only on cognitive event evaluation and ignore other emotion components, and no "constructivist theorist" would argue that emotions consist only of conceptual labelling.

In consequence, it seems that, on the whole, the emotion process sketched out in Figure 1 might be a reasonable basis for further theoretical development in the field, at least with respect to the components – the direction of the arrows will certainly be subject to further debate. The nature of an emotion episode can be summarised as follows: Individuals are exposed to stimuli, events, or situations generating an "overwhelming idea" of personal significance and potentially requiring some kind of reaction. This sets off a parallel, multi-level, and recursive process to determine, form, or construct the nature of this reaction. The first stage after elicitation is a subjective analysis and evaluation of the eliciting stimulus/event/situation in terms of its consequences, implications, and action requirements, involving a variety of attribution and appraisal mechanisms. The results of this evaluation process, which generally runs through several recursive cycles involving

interactions between criteria, produces a synchronised effect on action tendencies and autonomic and somatic responses (including expressions). These in turn, are also evaluated by the appraisal system in the context of the results of situation evaluation until some degree of closure is achieved. The constantly changing evaluation results are represented in the form of continuously updated schemata, which constitute the unconscious representation of an integrated feeling (*qualia*) of the emotional experience (core affect). Parts of this feeling representation can enter consciousness (Scherer, 2005b) and, especially when social communication of the felt experience seems desirable, give rise to categorisation and eventually verbal labelling.

An important aspect, which is often neglected in emotion theories, is that this process is shaped by the social, cultural, and historic context in which the episode takes place. For example, valence appraisal is highly dependent on cultural or group preferences, judgment on norm compatibility of actions depends on the modal code in a group or society, and categorisation and labelling are obviously dependent on the constructs and verbal labels generated by the semantic structure of the respective language. This important issue is addressed in a forthcoming article in this theory section by Keltner et al. (*in press*), which presents a social-functional theory of emotion.

Different theorists will of course continue to focus more on different parts of the emotion process – which is indeed desirable, as it seems virtually impossible to obtain a detailed theoretical model of the complex process as a whole that can be easily tested. In addition, the expertise of the respective theorists in their area of specialisation is likely to enrich further theory development. The aim of efforts towards convergence is thus to encourage an unbiased discussion of the similarities and differences between concepts and mechanisms proposed by different theories, rather than theory integration or finding consensus at a low level. The similarities between major theories outlined above, together with the different foci of attention, suggest that there is a high degree of complementarity between several theories, encouraging efforts to jointly work toward a more integrated framework to guide future empirical work. The challenge then is, as pointed out by Gigerenzer and Matthews, to develop potentially complementary theories in such a way that research results can be compared and integrated. As mentioned before, this requires the

existence of a relatively consensual *working definition* – possibly in the form of a revised version of Table 1 (or some other appropriate format).

Outlook and some concrete suggestions

Calls for systematic theory comparison and convergence have been made repeatedly. 20 years ago, a previous review on psychological theories of emotion (Scherer, 2000b, p. 156) came to the following conclusion: “... it may well be possible to achieve convergence between the various psychological models discussed in this chapter after acknowledgment of their different foci and respective explanations for various aspects of the emotion process”, suggesting to use a model focusing on the components of emotion in this attempt and to aim at a theoretical framework that can be incorporated into the conceptual structures of adjoining disciplines to allow easy transfer of concepts and findings.

Similarly, Russell concluded his foundational article advocating a constructionist stance as follows: “The framework outlined here is not a new theory of emotion but the specific combination of prior theories that I find most promising. Perhaps its value will be in stimulating its critics to propose other combinations.” (Russell, 2003, p. 167). While these suggestions had little success in bringing about convergence in the last 20 years, now might be time to start a concerted effort towards theory convergence in emotion science. In fact, recently Moors (2017) has made a valiant effort to demonstrate the feasibility of integrating “two skeptical emotion theories: dimensional appraisal theory and Russell’s psychological construction theory”.

More recently, Scarantino and de Sousa (2021), in their authoritative summary of major emotion theories showing that there is a great diversity of views on the nature and functions of emotion, come to the following conclusion: “The exploration of these insights and the resolution of the disagreements around them is a thriving interdisciplinary project in contemporary emotion theory. Philosophers and affective scientists will continue to engage in it for years to come, putting their distinctive theoretical skills at the service of projects of common interest.”

One could envisage the following next steps:

- Agree on a polythetic definition of the phenomenon of interest – emotion, including potential subtypes

- Identify the up-to-date assumptions of the major theory families and their variations
- Clarify the central concepts involved: What exactly is meant by basic, discrete, core affect, construction, evaluation or appraisal, feeling, emotional experience, etc.
- Agree on the components involved in a typical emotion episode (and their interactions)
- Determine to what extent theories address the same elements of the emotion process and illustrate how theories differ on certain elements, especially with regard for the type of effects predicted for different determinants
- Identify emotional phenomena (experimentally established and everyday facts about emotions, see Reisenzein, *in press*) clearly recognised by all theories as relevant and identify the different hypotheses proposed that can be empirically tested
- Use explicit process path models in an attempt to clarify differential claims of competing theories about the underlying causal structures including recursive processes
- Provide reviews (or even meta-analytic surveys) of empirical studies showing the current state of empirical support for some of the major claims of different theories (there is an enormous amount of highly relevant empirical data available in the literature, e.g. Keltner et al., 2019a, Koole, 2009; Kreibitz, 2010; Mesquita & Frijda, 1992; Scherer & Moors, 2019)
- Initiate efforts aimed at systematic theory comparison by asking emotion theorists to specify their emotion definition (according to the design-feature approach proposed above), clearly outline their central concepts, explain the central mechanisms in their model, and, on that basis, suggest hypotheses and appropriate operationalizations for a number of central phenomena such as autonomic reactions, facial/vocal expression, and action tendencies generated in the emotion process, as well as the labelling of the total emotional experience.

This all sounds like a tall order and it is. However, as the brief discussion of similarities between theories suggests, it is not an unrealistic goal either, especially if a coherent survey of empirical investigations of the currently held theoretical predictions by different theory families were to become available. If this concerted effort were to succeed, it would constitute a

major stimulus for in-depth research on central aspects of the emotion process. Apart from freeing researchers from having to justify the choice of a particular theory and to adhere to the respective canon, it could greatly contribute to an optimisation of complementary theories. A central element of this process could be the development of a common coherent theoretical framework that sets an agenda for empirical research efforts on a basis of explicit predictions. This should allow to clearly distinguish between competing hypotheses concerning the mechanisms generating specific emotional experiences and behaviours and to evaluate the pertinent empirical evidence. However, a theory convergence approach should also encourage richness of description of the complex emotion processes rather than narrowly focus on the evaluation of a few conflicting hypotheses.

In the long run, systematic research guided by a convergent theoretical framework should benefit the cumulativeness of our knowledge about the elusive phenomenon investigated by emotion science. In addition, a convergent theoretical framework generated by emotion psychology will greatly facilitate the exchange with many other subdisciplines in our field, such as developmental, personality, social, and applied psychology, which study a large variety of affective phenomena. Last but not least, an interdisciplinary approach to studying emotion (e.g. Von Scheve & Von Luede, 2005), would seem hardly feasible without at least a rudimentary version of a convergent theoretical framework.

Disclosure statement

No potential conflict of interest was reported by the author(s).

ORCID

Klaus R. Scherer  <http://orcid.org/0000-0001-9526-0144>

References

- Arnold, M. B. (1960). *Emotion and personality. Vol. 1. Psychological aspects*. Columbia University Press.
- Averill, J. R. (1980). A constructivist view of emotion. In R. Plutchik and H. Kellerman (Eds.), *Emotion: Theory, research and experience: Vol. 1. Theories of emotion* (pp. 305–339). New York: Academic Press. Reprinted in: Halberstadt, A. G., & Ellyson, S. L. (Eds.) (1990). *Social psychology readings: A century of research* (pp. 143–156). New York: McGraw-Hill.
- Averill, J. R. (1997). The emotions: An integrative approach. In R. Hogan, & J. A. Johnson (Eds.), *Handbook of personality psychology* (pp. 513–541). Academic Press.

- Barrett, L. F. (2017). The theory of constructed emotion: An active inference account of interoception and categorization. *Social Cognitive and Affective Neuroscience*, 12(1), 34–36. <https://doi.org/10.1093/scan/nsw156>
- Beermann, U., Hosoya, G., Schindler, I., Scherer, K. R., Eid, M., Wagner, V., & Menninghaus, W. (2021). Dimensions and clusters of aesthetic emotions: A semantic profile analysis. *Frontiers in Psychology*, 12, 1949. <https://doi.org/10.3389/fpsyg.2021.667173>
- Bell, R. C. (2003). The repertory grid technique. In F. Fransella (Ed.), *International handbook of personal construct psychology* (pp. 95–103). John Wiley & Sons Ltd. <https://doi.org/10.1002/0470013370.ch9>
- Boyd, R. N. (1999). Homeostasis, species, and higher taxa. In R. A. Wilson (Ed.), *Species: New interdisciplinary essays* (pp. 141–185). MIT Press.
- Boyd, R. N. (2010). Homeostasis, higher taxa, and monophyly. *Philosophy of Science*, 77(5), 686–701. <https://doi.org/10.1086/656551>
- Brosch, T., & Sander, D. (2013). Comment: The appraising brain: Towards a neuro-cognitive model of appraisal processes in emotion. *Emotion Review*, 5(2), 163–168. <https://doi.org/10.1177/1754073912468298>
- Brown, R. (1958a). How shall a thing be called? *Psychological Review*, 65(1), 14–21. <https://doi.org/10.1037/h0041727>
- Brown, R. (1958b). *Words and Things: an Introduction to language*. The Free Press. ISBN 0-02-904810-9 (1968 ed.).
- Cannon, W. B. (1927). The James-Lange theory of emotions: A critical examination and an alternative theory. *The American Journal of Psychology*, 39(1/4), 106–124. <https://doi.org/10.2307/1415404>
- Clore, G. L., & Ortony, A. (2008). Appraisal theories: How cognition shapes affect into emotion. In M. Lewis, J. M. Haviland-Jones, & L. F. Barrett (Eds.), *Handbook of emotions* (pp. 628–642). The Guilford Press.
- Colombetti, G. (2014). *The feeling body: Affective science meets the enactive mind*. MIT Press.
- Cowen, A. S., & Keltner, D. (2017). Self-report captures 27 distinct categories of emotion bridged by continuous gradients. *Proceedings of the National Academy of Sciences of the United States of America*, 114(38), E7900–E7909. <https://doi.org/10.1073/pnas.1702247114>
- Cowen, A., & Keltner, D. (2021). Emotional experience, expression, and brain activity are high-dimensional, categorical, and blended. *Trends in Cognitive Science*, 25(2), 124–136. <https://doi.org/10.1016/j.tics.2020.11.004>
- Ekman, P. (1984). Expression and the nature of emotion. In K. R. Scherer, & P. Ekman (Eds.), *Approaches to emotion* (pp. 319–344). Erlbaum.
- Ekman, P. (1992). An argument for basic emotions. *Cognition and Emotion*, 6(3–4), 169–200. <https://doi.org/10.1080/02699939208411068>
- Ekman, P. (2004). What we become emotional about. In A. S. R. Manstead, N. Frijda, & A. Fischer (Eds.), *Feelings and emotions: The Amsterdam symposium* (pp. 119–135). Cambridge University Press.
- Ellsworth, P. C. (1994). William James and emotion: Is a century of fame worth a century of misunderstanding? *Psychological Review*, 101(2), 222. <https://doi.org/10.1037/0033-295X.101.2.222>
- Ellsworth, P. C. (2013). Appraisal theory: Old and new questions. *Emotion Review*, 5(2), 125–131. <https://doi.org/10.1177/1754073912463617>
- Ellsworth, P. C., & Scherer, K. R. (2003). Appraisal processes in emotion. In R. J. Davidson, K. R. Scherer, & H. Goldsmith (Eds.), *Handbook of the affective sciences* (pp. 572–595). Oxford University Press.
- Fogel, A., Nwokah, E., Dedo, J. Y., Messinger, D., Dickson, K. L., Matusov, E., & Holt, S. A. (1992). Social process theory of emotion: A dynamic systems approach. *Social Development*, 1(2), 122–142. <https://doi.org/10.1111/j.1467-9507.1992.tb00116.x>
- Fontaine, J. R. J., Scherer, K. R., Roesch, E. B., & Ellsworth, P. E. (2007). The world of emotions is not two-dimensional. *Psychological Science*, 18(12), 1050–1057. <https://doi.org/10.1111/j.1467-9280.2007.02024.x>
- Fontaine, J. R. J., Scherer, K. R., & Soriano, C. (Eds.). (2013). *Components of emotional meaning: A sourcebook*. Oxford University Press.
- Frijda, N. H. (1987). Emotion, cognitive structure, and action tendency. *Cognition & Emotion*, 1(2), 115–143. <https://doi.org/10.1080/02699938708408043>
- Frijda, N. H. (2007). *The laws of emotion*. Lawrence Erlbaum.
- Frijda, N. H. (2009). Emotion experience and its varieties. *Emotion Review*, 1(3), 264–271. <https://doi.org/10.1177/1754073909103595>
- Gentsch, K., Grandjean, D., & Scherer, K. R. (2015). Temporal dynamics and potential neural sources of goal conduciveness, control, and power appraisal. *Biological Psychology*, 112, 77–93. <https://doi.org/10.1016/j.biopsycho.2015.10.001>
- Gentsch, K., Beermann, U., Wu, L., Trznadel, S., & Scherer, K. R. (2020). Temporal unfolding of micro-valences in facial expression evoked by visual. *Auditory, and Olfactory Stimuli. Affective Science*, 1(4), 208–224. <https://doi.org/10.1007/s42761-020-00020-y>. Open Access: <https://rdcu.be/calNA>.
- Gigerenzer, G. (2017). A theory integration program. *Decision*, 4/3, 133–145. <https://doi.org/10.1037/dec0000082>
- Grandjean, D., Sander, D., & Scherer, K. R. (2008). Conscious emotional experience emerges as a function of multilevel, appraisal-driven response synchronization. *Consciousness and Cognition*, 17(2), 484–495. <https://doi.org/10.1016/j.concog.2008.03.019>
- Grandjean, D., & Scherer, K. R. (2008). Unpacking the cognitive architecture of emotion processes. *Emotion*, 8(3), 341–351. <https://doi.org/10.1037/1528-3542.8.3.341>
- Guex, R., Méndez-Bértolo, C., Moratti, S., Strange, B. A., Spinelli, L., Murray, R. J., ... Domínguez-Borrás, J. (2020). Temporal dynamics of amygdala response to emotion- and action-relevance. *Scientific Reports*, 10(1), 1–16. <https://doi.org/10.1038/s41598-020-67862-1>
- Hibberd, F. J. (2019). What is scientific definition? *Journal of Mind & Behavior*, 40(1), 29–52.
- Hockett, C. F., & Hockett, C. D. (1960). The origin of speech. *Scientific American*, 203(3), 88–96. <https://doi.org/10.1038/scientificamerican0960-88>
- Hosoya, G., Schindler, I., Beermann, U., Wagner, V., Menninghaus, W., Eid, M., & Scherer, K. R. (2017). Mapping the conceptual domain of aesthetic emotion terms: A pile-sort study. *Psychology of Aesthetics, Creativity, and the Arts*, 11(4), 457–473. <https://doi.org/10.1037/aca0000123>

- Izard, C. E. (1992). Basic emotions, relations among emotions, and emotion-cognition relations. *Psychological Review*, 99 (3), 561–565. <https://doi.org/10.1037/0033-295X.99.3.561>
- Izard, C. E. (2007). Basic emotions, natural kinds, emotion schemas, and a new paradigm. *Perspectives on Psychological Science*, 2(3), 260–280. <https://doi.org/10.1111/j.1745-6916.2007.00044.x>
- Izard, C. E. (2009). Emotion theory and research: Highlights, unanswered questions, and emerging issues. *Annual Review of Psychology*, 60(1), 1–25. <https://doi.org/10.1146/annurev.psych.60.110707.163539>
- Izard, C. E. (2010). The many meanings/aspects of emotion: Definitions, functions, activation, and regulation. *Emotion Review*, 2(4), 363–370. <https://doi.org/10.1177/1754073910374661>
- James, W. (1894). Discussion: The physical basis of emotion.. *Psychological Review*, 1(5), 516–529. <https://doi.org/10.1037/h0065078>
- James, W. (1969). What is an emotion? In *William James: collected essays and reviews* (pp. 244–280). Russell and Russell. (Original work published 1884).
- Keltner, D., & Haidt, J. (1999). Social functions of emotions at multiple levels of analysis. *Cognition and Emotion*, 13(5), 505–521. <https://doi.org/10.1080/026999399379168>
- Keltner, D., Sauter, D., Tracy, J., & Cowen, A. (2019a). Emotional expression: Advances in basic emotion theory. *Journal of Nonverbal Behavior*, 1–28. <https://doi.org/10.1007/s10919-019-00293-3>
- Keltner, D., Tracy, J. L., Sauter, D., & Cowen, A. (2019b). What basic emotion theory really says for the twenty-first century study of emotion. *Journal of Nonverbal Behavior*, 43(2), 195–201. <https://doi.org/10.1007/s10919-019-00298-y>
- Keltner, D., Sauter, D., Tracy, J. L., Wetchler, E., & Cowen, A. (in press). How emotions, relationships, and culture constitute each other: Advances in social functionalist theory. *Cognition and Emotion*.
- Koole, S. L. (2009). The psychology of emotion regulation: An integrative review. *Cognition and Emotion*, 23(1), 4–41. <https://doi.org/10.1080/02699930802619031>
- Kreibig, S. D. (2010). Autonomic nervous system activity in emotion: A review. *Biological Psychology*, 84(3), 394–421. <https://doi.org/10.1016/j.biopsycho.2010.03.010>
- Kuppens, P., Stouten, J., & Mesquita, B. (2009). Individual differences in emotion components and dynamics: Introduction to the special issue. *Cognition and Emotion*, 23(7), 1249–1258. <https://doi.org/10.1080/02699930902985605>
- Kuppens, P., & Verduyn, P. (2017). Emotion dynamics. *Current Opinion in Psychology*, 17, 22–26. <https://doi.org/10.1016/j.copsyc.2017.06.004>
- Lange, J., Dalege, J., Borsboom, D., van Kleef, G. A., & Fischer, A. H. (2020). Toward an integrative psychometric model of emotions. *Perspectives on Psychological Science*, 15(2), 444–468. <https://doi.org/10.1177/1745691619895057>
- Lange, J., & Zickfeld, J. H. (2021). Emotions as overlapping causal networks of emotion components: Implications and methodological approaches. *Emotion Review*, 13(2), 157–167. <https://doi.org/10.1177/1754073920988787>
- Larsen, J. T., & McGraw, A. P. (2011). Further evidence for mixed emotions. *Journal of Personality and Social Psychology*, 100(6), 1095–1110. <https://doi.org/10.1037/a0021846>
- Larsen, J. T., Coles, N. A., & Jordan, D. K. (2017). Varieties of mixed emotional experience. *Current Opinion in Behavioral Sciences*, 15, 72–76. <https://doi.org/10.1016/j.cobeha.2017.05.021>
- Lazarus, R. S. (1996). The role of coping in the emotions and how coping changes over the life course. In Magai, C., & McFadden, S. H. (Eds.). *Handbook of emotion, adult development, and aging* (pp. 289–306). Academic Press.
- Lazarus, R. S. (2006). *Stress and emotion: A new synthesis*. Springer Publishing Company.
- Leitão, J., Meuleman, B., Van De Ville, D., & Vuilleumier, P. (2020). Computational imaging during video game playing shows dynamic synchronization of cortical and subcortical networks of emotions. *PLoS Biology*, 18(11), e3000900. <https://doi.org/10.1371/journal.pbio.3000900>
- Leventhal, H., & Scherer, K. R. (1987). The relationship of emotion to cognition: A functional approach to a semantic controversy. *Cognition and Emotion*, 1(1), 3–28. <https://doi.org/10.1080/02699938708408361>
- Lewis, M. D. (2005). Bridging emotion theory and neurobiology through dynamic systems modeling. *Behavioral and Brain Sciences*, 28(2), 169–194. <https://doi.org/10.1017/S0140525X0500004X>
- Mandler, G. (1990). A constructivist theory of emotion. In N. L. Stein, B. B. Leventhal, & T. Trabasso (Eds.), *Psychological and Biological approaches to emotion* (pp. 21–44). Erlbaum.
- Matthews, G. (2020). Against consensus: Embracing the disunity of personality theory. *Personality and Individual Differences*, 152, 109535. <https://doi.org/10.1016/j.paid.2019.109535>
- Maul, A. (2017). Rethinking traditional methods of survey validation. *Measurement: Interdisciplinary Research and Perspectives*, 15(2), 51–69. <https://doi.org/10.1080/15366367.2017.1348108>
- Mauss, I. B., Levenson, R. W., McCarter, L., Wilhelm, F. H., & Gross, J. J. (2005). The tie that binds? Coherence among emotion experience, behavior, and physiology. *Emotion*, 5(2), 175–190. <https://doi.org/10.1037/1528-3542.5.2.175>
- Mesquita, B., & Frijda, N. H. (1992). Cultural variations in emotions: A review. *Psychological Bulletin*, 112(2), 179–204. <https://doi.org/10.1037/0033-2909.112.2.179>
- Mischel, W. (2008, December). The toothbrush problem. *Observer*, 21(11). <http://www.psychologicalscience.org/observer/thetoothbrush-problem#.WSRwCOuGOUk>
- Mohammadi, G., Lin, K., & Vuilleumier, P. (2019, September). Towards Understanding Emotional Experience in a Componential Framework. In 2019 8th International Conference on Affective Computing and Intelligent Interaction (ACII) (pp. 123–129). IEEE.
- Moors, A. (2013). On the causal role of appraisal in emotion. *Emotion Review*, 5(2), 132–140. <https://doi.org/10.1177/1754073912463601>
- Moors, A. (2014). Flavors of appraisal theories of emotion. *Emotion Review*, 6(4), 303–307. <https://doi.org/10.1177/1754073914534477>
- Moors, A. (2017). Integration of two skeptical emotion theories: Dimensional appraisal theory and Russell's psychological construction theory. *Psychological Inquiry*, 28(1), 1–19. <https://doi.org/10.1080/1047840X.2017.1235900>
- Moors, A., Ellsworth, P. C., Scherer, K. R., & Frijda, N. H. (2013). Appraisal theories of emotion: State of the art and future development. *Emotion Review*, 5(2), 119–124. <https://doi.org/10.1177/1754073912468165>

- Mulligan, K., & Scherer, K. R. (2012). Toward a working definition of emotion. *Emotion Review*, 4(4), 345–357. <https://doi.org/10.1177/1754073912445818>
- Oatley, K., & Johnson-Laird, P. N. (2014). Cognitive approaches to emotions. *Trends in Cognitive Sciences*, 18(3), 134–140. <https://doi.org/10.1016/j.tics.2013.12.004>
- Parrott, W. G. (2007). Components and the definition of emotion. *Social Science Information*, 46(3), 419–423. <https://doi.org/10.1177/05390184070460030109>
- Reisenzein, R. (in press). *Tasks for a theoretical psychology of emotion*. Cognition and Emotion.
- Reisenzein, R. (2000). Exploring the strength of association between the components of emotion syndromes: The case of surprise. *Cognition & Emotion*, 14(1), 1–38. <https://doi.org/10.1080/026999300378978>
- Reisenzein, R., & Hofmann, T. (1993). Discriminating emotions from appraisal-relevant situational information: Baseline data for structural models of cognitive appraisals. *Cognition & Emotion*, 7(3–4), 271–293. <https://doi.org/10.1080/02699939308409190>
- De la Rochefoucault, F. (1678). *Réflexions ou sentences et maxims morales* (no. 136, p. 127). Barbin.
- Roseman, I. J. (1994). Emotions and emotion families in the emotion system. *Proceedings of the 8th International Conference of the International Society for Research on Emotions*, 171–175. <https://doi.org/10.7282/T31N836X>
- Roseman, I. J. (2001). A model of appraisal in the emotion system: Integrating theory, research, and applications. In K. R. Scherer, A. Schorr, & T. Johnstone (Eds.), *Appraisal processes in emotion: Theory, methods, research* (pp. 68–91). Oxford University Press.
- Roseman, I. J., & Evdokas, A. (2004). Appraisals cause experienced emotions: Experimental evidence. *Cognition and Emotion*, 18(1), 1–28. <https://doi.org/10.1080/02699930244000390>
- Rossiter, J. R. (2017). Optimal standard measures: Comment on Matthews et al. (2016). *American Psychologist*, 72(5), 489–490. <https://doi.org/10.1037/amp0000131>
- Russell, J. A. (1980). A circumplex model of affect. *Journal of Personality and Social Psychology*, 39(6), 1161–1178. <https://doi.org/10.1037/h0077714>
- Russell, J. A. (2003). Core affect and the psychological construction of emotion. *Psychological Review*, 110(1), 145–172. <https://doi.org/10.1037/0033-295X.110.1.145>
- Russell, J. A. (2009). Emotion, core affect, and psychological construction. *Cognition and Emotion*, 23(7), 1259–1283. <https://doi.org/10.1080/02699930902809375>
- Russell, J. A., & Barrett, L. F. (1999). Core affect, prototypical emotional episodes, and other things called emotion: Dissecting the elephant. *Journal of Personality and Social Psychology*, 76(5), 805. <https://doi.org/10.1037/0022-3514.76.5.805>
- Sander, D., Grandjean, D., & Scherer, K. R. (2005). A systems approach to appraisal mechanisms in emotion. *Neural Networks*, 18(4), 317–352. <https://doi.org/10.1016/j.neunet.2005.03.001>
- Sander, D., Grandjean, D., & Scherer, K. R. (2018). An appraisal-driven componential approach to the emotional brain. *Emotion Review*, 10(3), 219–231. <https://doi.org/10.1177/1754073918765653>
- Scarantino, A. & de Sousa, R. (2021) Emotion. In E. N. Zalta (Ed.) *The Stanford encyclopedia of philosophy* (Summer 2021 Edition), URL=<<https://plato.stanford.edu/archives/sum2021/entries/emotion/>>.
- Scherer, K. R. (1984). On the nature and function of emotion: A component process approach. In K. R. Scherer, & P. Ekman (Eds.), *Approaches to emotion* (pp. 293–317). Erlbaum.
- Scherer, K. R. (1994). Toward a concept of “modal emotions”. In P. Ekman, & R. J. Davidson (Eds.), *The nature of emotion: Fundamental questions* (pp. 25–31). Oxford University Press.
- Scherer, K. R. (1997a). The role of culture in emotion-antecedent appraisal. *Journal of Personality and Social Psychology*, 73(5), 902–922. <https://doi.org/10.1037/0022-3514.73.5.902>
- Scherer, K. R. (1997b). Profiles of emotion-antecedent appraisal: Testing theoretical predictions across cultures. *Cognition and Emotion*, 11(2), 113–150. <https://doi.org/10.1080/026999397379962>
- Scherer, K. R. (2000a). Emotions as episodes of subsystem synchronization driven by nonlinear appraisal processes. In M. D. Lewis, & I. Granic (Eds.), *Emotion, development, and self-organization: Dynamic systems approaches to emotional development* (pp. 70–99). Cambridge University Press.
- Scherer, K. R. (2000b). Psychological models of emotion. In J. Borod (Ed.), *The neuropsychology of emotion* (pp. 137–162). Oxford University Press.
- Scherer, K. R. (2001). The nature and study of appraisal: A review of the issues. In K. R. Scherer, A. Schorr, & T. Johnstone (Eds.), *Appraisal processes in emotion: Theory, methods, research* (pp. 369–391). Oxford University Press.
- Scherer, K. R. (2005a). What are emotions? And how can they be measured? *Social Science Information*, 44(4), 695–729. <https://doi.org/10.1177/0539018405058216>
- Scherer, K. R. (2005b). Unconscious processes in emotion: The bulk of the iceberg. In L. Feldman Barrett, P. M. Niedenthal, & P. Winkelman (Eds.), *Emotion and consciousness* (pp. 312–334). Guilford Press.
- Scherer, K. R. (2009a). The dynamic architecture of emotion: Evidence for the component process model. *Cognition and Emotion*, 23(7), 1307–1351. <https://doi.org/10.1080/02699930902928969>
- Scherer, K. R. (2009b). Emotions are emergent processes. They require a dynamic computational architecture. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 364 (1535), 3459–3474. <https://doi.org/10.1098/rstb.2009.0141>
- Scherer, K. R. (2012). Neuroscience findings are consistent with appraisal theories of emotion; but does the brain “respect” constructionism? *Behavioral and Brain Sciences*, 35(3), 163–164. <https://doi.org/10.1017/S0140525X11001750>
- Scherer, K. R. (2019). Studying appraisal-driven emotion processes: Taking stock and moving to the future. *Cognition and Emotion*, 33(1), 31–40. <https://doi.org/10.1080/02699931.2018.1510380>
- Scherer, K. R. (2021). Towards a prediction and data driven computational process model of emotion. *IEEE Transactions on Affective Computing*, 12(2), 279–292. <https://doi.org/10.1109/TAFFC.2019.2905209>
- Scherer, K. R., & Ellgring, H. (2007). Are facial expressions of emotion produced by categorical affect programs or dynamically driven by appraisal? *Emotion*, 7(1), 113–130. <https://doi.org/10.1037/1528-3542.7.1.113>

- Scherer, K. R., & Mehu, M. (2015). Normal and abnormal emotions—The quandary of diagnosing affective disorder: Introduction and overview. *Emotion Review*, 7(3), 201–203. <https://doi.org/10.1177/1754073915576689>
- Scherer, K. R., & Meuleman, B. (2013). Human emotion experiences can be predicted on theoretical grounds: Evidence from verbal labeling. *PLoS ONE*, 8(3), e58166. <https://doi.org/10.1371/journal.pone.0058166>
- Scherer, K. R., & Moors, A. (2019). The emotion process: Event appraisal and component differentiation. *Annual Review of Psychology*, 70(1), 719–745. <https://doi.org/10.1146/annurev-psych-122216-011854>
- Scherer, K. R., Mortillaro, M., Rotondi, I., Sergi, I., & Trznadel, S. (2018). Appraisal-driven facial actions as building blocks for emotion recognition. *Journal of Personality and Social Psychology*, 114(3), 358–379. <https://doi.org/10.1037/pspa0000107>
- Scherer, K. R., & Peper, M. (2001). Psychological theories of emotion and neuropsychological research. In F. Boller, & J. Grafman (Eds.), *Handbook of neuropsychology. Vol. 5 (Emotional behavior and its disorders)*, ed. G. Gainotti (pp. 17–48). Elsevier.
- Scherer, K. R., Wranik, T., Sangsue, J., Tran, V., & Scherer, U. (2004). Emotions in everyday life: Probability of occurrence, risk factors, appraisal and reaction pattern. *Social Science Information*, 43(4), 499–570. <https://doi.org/10.1177/0539018404047701>
- Shaver, P., Schwartz, J., Kirson, D., & O'Connor, C. (1987). Emotion knowledge: Further exploration of a prototype approach. *Journal of Personality and Social Psychology*, 52(6), 1061–1086. <https://doi.org/10.1037/0022-3514.52.6.1061>
- Sheppes, G., & Gross, J. J. (2011). Is timing everything? Temporal considerations in emotion regulation. *Personality and Social Psychology Review*, 15(4), 319–331. <https://doi.org/10.1177/1088868310395778>
- Shiota, M. N., & Keltner, D. (2005). What do emotion words represent? *Psychological Inquiry*, 16(1), 32–37.
- Shuman, V., Clark-Polner, E., Meuleman, B., Sander, D., & Scherer, K. R. (2017). Emotion perception from a componential perspective. *Cognition and Emotion*, 31(1), 47–56. <https://doi.org/10.1080/02699931.2015.1075964>
- Smith, C. A. (1989). Dimensions of appraisal and physiological response in emotion. *Journal of Personality and Social Psychology*, 56(3), 339–353. <https://doi.org/10.1037/0022-3514.56.3.339>
- Smith, C. A., & Ellsworth, P. C. (1985). Patterns of cognitive appraisal in emotion. *Journal of Personality and Social Psychology*, 48(4), 813–838. <https://doi.org/10.1037/0022-3514.48.4.813>
- Smith, C. A., & Lazarus, R. S. (1993). Appraisal components, core relational themes, and the emotions. *Cognition & Emotion*, 7(3–4), 233–269. <https://doi.org/10.1080/02699939308409189>
- Starobinski, J. (2013). On nostalgia. In T. Cochrane, B. Fantini, & K. R. Scherer (Eds.), *The emotional power of music*. Oxford University Press. (translated from 2003, *Sur la nostalgie. La mémoire tourmentée. Cliniques méditerranéennes*, 1/67, 191–202).
- Turner, T. J., & Ortony, A. (1992). Basic emotions: Can conflicting criteria converge? *Psychological Review*, 99(3), 566–571. <https://doi.org/10.1037/0033-295X.99.3.566>
- van Reekum, C. M., & Scherer, K. R. (1997). Levels of processing for emotion-antecedent appraisal. In G. Matthews (Ed.), *Cognitive science perspectives on personality and emotion* (pp. 259–300). Elsevier Science.
- Von Scheve, C., & Von Luede, R. (2005). Emotion and social structures: Towards an interdisciplinary approach. *Journal for the Theory of Social Behaviour*, 35(3), 303–328. <https://doi.org/10.1111/j.1468-5914.2005.00274.x>
- Wierzbicka, A. (1993). Reading human faces: Emotion components and universal semantics. *Pragmatics & Cognition*, 1(1), 1–23. <https://doi.org/10.1075/pc.1.1.03wie>
- Wundt, W. (1897). *Outlines of psychology* (C. H. Judd, Trans.). Engelman.