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**Klaus R Scherer**

Swiss Center for Affective Sciences (CISA), University of Geneva

Abstract

The connections between emotion and rationality are reexamined. Historically, Plato's doctrine of the tripartite soul has established the preconception of a strict separation of emotion/passion from cognition/rationality, encouraging the biased perception that emotions are inherently irrational. To examine whether emotions can be rational, one must first examine the various meanings of *rationality* as developed in philosophy, psychology and the social and economic sciences. In this article, three forms of rationality are distinguished, and it is suggested that they can act as criteria to judge the rationality of emotions. Furthermore, before examining the possible relationships between emotion and rationality, the concept of *emotion* needs a more precise definition. A convergent definition of emotion is proposed in the form of a componential model that is based on an appraisal mechanism that produces tendencies for action to deal rapidly with important and urgent events in an individual's life. It is demonstrated that emotions can be more or less correct or appropriate depending on the accuracy or realism of the underlying appraisal, the appropriateness of the response pattern and the efficacy of the emotion regulation. Considered in the framework of this componential model, it is suggested that emotions can be assessed as to whether, in a particular situation, they are adaptive (functional), based on well-grounded, accurate inference from available information and considered as reasonable reactions by others. Emotions can be considered rational when they fulfill at least one of these three criteria of rationality.

Keywords

adaptiveness, cognition, emotion, emotion components, emotion regulation, rationality, reason

Corresponding author:

Klaus Scherer, CISA, University of Geneva, 7 rue des Batoirs, CH-1205 Geneva, Switzerland

Email: Klaus.Scherer@unige.ch; personal web page <http://www.affective-sciences.org/user/scherer>

Résumé

Les connexions entre l'émotion et la rationalité sont réexaminées. Historiquement, la doctrine platonicienne de l'âme tripartite a établi l'idée d'une séparation stricte de l'émotion/passion de la cognition/rationalité, ayant encouragé le préjugé que les émotions sont fondamentalement irrationnelles. Pour examiner si les émotions pourraient être considérées comme rationnelles, au moins dans certain cas, il faut d'abord examiner les différentes significations de la rationalité telle que développée dans la philosophie, la psychologie et les sciences sociales et économiques. Ici, trois formes de rationalité sont distinguées, et il est suggéré qu'elles peuvent servir en tant que critères pour juger de la rationalité des émotions. En outre, pour examiner les relations possibles entre l'émotion et la rationalité nous avons besoin d'une définition plus précise de l'émotion. Ici, une définition de l'émotion est proposée sous la forme d'un modèle componentiel basé sur un mécanisme d'évaluation qui prépare des tendances à l'action et ainsi permet de faire face rapidement à des événements importants et urgents dans la vie d'un individu. Considéré dans le cadre de ce modèle componentiel, il est démontré que les émotions peuvent être plus ou moins correctes ou appropriées, dans une situation donnée, en fonction du bien-fondé ou du réalisme de l'évaluation sous-jacente, l'adaptation de la réponse et l'efficacité de la régulation. Il est suggéré que les émotions peuvent être considérées comme rationnelles quand elles remplissent une ou plusieurs de ces trois critères de la rationalité.

Mots-clés

adaptivité, cognition, composantes de l'émotion, émotion, raison, rationalité, régulation de l'émotion

Given that this issue of *Social Science Information* celebrates the 50th anniversary of the journal, it seems fitting to briefly outline the origin of the current contribution. Emotions have long been considered as dysfunctional and irrational. I beg to disagree. Early on, I proposed in this journal (Scherer, 1982) that, far from being dysfunctional, the emotion system is one of the most efficient phylogenetically evolved mechanisms for adaptation in higher organisms. More specifically, it can be shown that it was the development of emotion that freed organisms from rigid stimulus control thus providing for a highly flexible behavioral repertoire and thus optimal adaptation to an ever-changing environment and multiple social contexts (see also Scherer, 2001). In 1984, Jon Elster and I organized a colloquium on 'Rationality and the Emotions', held at the Maison des Sciences de l'Homme in Paris, which gave rise to a special issue of *Social Science Information* (24:2, 1985). This conference brought together some of the leading philosophers, psychologists and social scientists working on emotion at the time, and the different viewpoints on the issue generated a fascinating debate. In my contribution to the meeting, I suggested that there is no contradiction between emotion and at least some forms of rationality, and that emotions can be considered rational much of the time (Scherer, 1985).

The debate on the rationality of emotions has been ongoing, although the proponents of a strict separation between *ratio* and *passio* have become less vociferous, and a fair number of influential voices have argued for a more integrative view (de Sousa, 1987; Elster, 1999; Frank, 1988; Gigerenzer, 2007; Kahneman, Slovic & Tversky, 1982; Nozick, 1993). A

change in the *Zeitgeist* is also indicated by the disproportionately large number of Nobel prizes bestowed on scholars who questioned the traditional assumption of ‘perfect rationality’ in economic behavior and highlighted the different ways in which affect and emotion influence human judgment and choice behavior (e.g. prizes for Simon, Selten, Kahneman). In psychology, there has been a boom in the publication of experimental studies underlining these doubts, showing frequent and sometimes massive violations of classic rationality assumptions in experimental tasks on reasoning, judgment and choice research. Following a review of this literature, Shafir & LeBoeuf (2002) proposed that the rationality critique is compelling and rightfully gaining influence in the social and behavioral sciences in general. In consequence, there is little evidence that human judgment and behavior are generally governed by the classic notion of rationality, which postulates completely logical inference and a perfect utility calculus. Rather, even in normal decision-making situations, less elaborated mechanisms seem to underlie human judgment and choice, many of them of an affective or emotional nature. Despite the mounting evidence for the massive presence of affective factors in human cognition and judgment, it is still widely believed that emotions are irrational or at least ‘non-rational’, and the debate seems alive and well.

I suspect that the persistence of the belief that emotions and rationality are uncomfortable bedfellows has its root in Plato’s notion of a tripartite soul that categorically distinguishes between cognition, emotion and motivational urges. This has strongly influenced notions of human nature for the last two millennia and shows few signs of decline (see Scherer, 1995, for a detailed analysis). While cognition is automatically considered as essentially rational, emotion or passion tends to be perceived as irrational. Strangely enough, the old Platonic notion of separate systems is resurrected by modern neuroscience. For example, a study by De Martino et al. (2006), showing that the framing of alternatives can affect behavioral choices, has been widely interpreted as showing that emotions ‘fuel irrational acts’ and that people who make irrational decisions when faced with problems are at the mercy of their emotions (BBC News; <http://news.bbc.co.uk/2/hi/health/5243146.stm>). The amygdala is seen as the origin of emotion and irrationality, the orbitofrontal cortex as the seat of rationality. Similarly, the ‘dual-systems’ notion claiming the existence of two separate processing systems, an automatic (emotion driven) and a controlled (cognition driven) one, which plays a major role in current neuro-economic accounts of behavioral choices (Loewenstein, Rick & Cohen, 2008; Rustichini, 2008), leans towards Plato and tends to see activity of the so-called controlled system (mostly conscious cognition) as a *sine qua non* condition for rationality.

I thought that it would be a fitting tribute to the anniversary of *SSI* to take up the notion of the rationality of emotions that I defended in 1985, i.e. that emotions *can* be rational, by exploring in this article exactly *when* emotions are rational.

I What does rationality mean?

Before we can make headway in this debate, we need to define what we take ‘rational’ to mean. To do this, I will draw on my original proposal in the earlier article published in this journal (Scherer, 1985), based on my functional approach to the emotions and influenced by Weber’s types of rationality (1964; see also Kalberg, 1980). Recently several additional proposals to distinguish different types of rationality have been made (Pham,

2007; Shafir & LeBoeuf, 2002), which are in part compatible with what I proposed earlier. However, no attempt is made to compare these different types of classification, as here the focus is more on the appropriateness of emotion.

I believe it is important to highlight that the model of perfect rationality (as proposed in classical economics, for example) implicitly assumes that all necessary information, including the probability of future consequences of an event or decision, is accessible to the person faced with the need to make a decision. It also assumes that there is sufficient time to engage in lengthy deliberations about the pros and cons of certain decisions. Unfortunately, such ideal conditions for rational decision-making rarely obtain. In many cases, urgent decisions to prepare for actions need to be taken in a short span of time and without much of the relevant information required by a completely rational calculus. Using considerable empirical evidence, Gigerenzer (2007) persuasively argues that we tend to follow 'gut' reactions (a popular term for action tendencies based on emotion), and these gut reactions provide more adaptive solutions to urgent problems, rather than basing decisions on rapid, imperfect and incomplete, 'rational' calculus. With this in mind, I will briefly evoke the three possible types of rationality as described in the previous article (Scherer, 1985). These are (1) rational in the sense of *functional/purposeful*, (2) rational in the sense of *intellectual/inferential* and (3) rational in the sense of *reasonable/consensual*. The original descriptions are given below.

1 Rational in the sense of functional (or purposeful). In many uses of the term rational, an optimal means–end relationship is implied. This is the case, for example, in Aristotle's notion of practical reason defined as the faculty with which we perceive (a) what means are available to us in order to achieve a goal, (b) which among these means are the most efficient, and/or the most appropriate, and (c) how to employ these means in actual conduct (after Angeles, 1981). The choice of appropriate means to reach specific ends or goals is also emphasized in Max Weber's concept of *Zweckrationalität* (Kalberg, 1980; Weber, 1964). While in both cases a cognitive, volitional choice of a means to reach an end is implied, it is possible to draw a parallel to the notion of functionality in biological adaptation.

2 Rational in the sense of intellectual (or inferential). Frequently, 'rational' is used in the generic sense of 'intellectual', originally meaning discernment or understanding. It seems to imply some form of cortical processing as well as structures of logical argument that emotion supposedly lacks. It should be noted, however, that in medieval philosophy *ratio* (reason, *Vernunft*) was often distinguished from *intellectus* (intelligence, *Verstand*; see Anacker, 1974). According to this view, *ratio* leads one to practical action and to a commonsense view of the world prior to the development or activity of human intelligence, whereas *intellectus* is the foundation for theorizing, speculating, abstracting, inferring and contemplating (Angeles, 1981). But even if we take rational in the sense of analytically cognitive and intellectual, it cannot be claimed that emotion is devoid of this kind of activity. As we shall see below, cognitive evaluation and inference (to be technically referred to as 'appraisal') are a central part of the emotion process. I will claim that, depending on the nature of the underlying appraisal, emotion processes can be rational in the sense of intellectual (or inferential).

3 Rational in the sense of reasonable (or consensual). In terms of commonsense understanding, rational is most often used in the sense of socially reasonable, understandable

and sensible. If an observer cannot empathize with the ‘rationale’ or the reasons behind behavior and think that other people would act similarly, he or she will consider that behavior irrational. Similarly, many philosophers (e.g. Kant, Peirce) have proposed a notion of reason where the intersubjective consensus is the defining criterion for accepting an opinion, norm or behavior as conforming to reason. Reason specifies the condition on the basis of which statements can be accepted as true (Anacker, 1974), and these must be defined by the consensus of a free community of ‘reasoning individuals’. Generally it depends on the attribution of others whether emotional reactions and/or their strength seem justified or reasonable in terms of the observed antecedent events. Social conventions can influence whether emotions are considered appropriate under certain circumstances. This type of rationality is close to what Weber (1964) called *Wertrationalität* (value-based rationality). This notion has been further developed by Etzioni (1988) in the sense of norm compatibility.

2 What does emotion mean?

In order to examine in more detail the sense in which emotions can be said to be rational, we first need to settle what ‘emotion’ means, a definitional issue that has been hotly debated ever since William James provocatively asked, in 1884, ‘What is an emotion?’ I have tried, in this journal (Scherer, 2005a), to review the situation and to suggest a definition that takes current thinking and research practice into account. In a special issue of this journal (46:3, 2007), Frijda (2007b,c) commented on the comments made by a group of eminent emotion scholars from different disciplines on my proposal, again showing major disagreements, yet at the same time suggesting a common thread. In trying to identify this emergent convergence of opinions among students of emotion, Frijda & Scherer (2009) have proposed that the following features of emotion are generally agreed upon by many scholars in the field and can thus be considered to be constitutive for a definition:

1. *Emotions involve the appraisal of stimuli.* Emotions are elicited when something happens that the organism considers relevant, by being directly linked to its sensitivities, needs, goals, values and general well-being. Organisms need to constantly scan external and internal stimulus input to check whether it requires deployment of attention, further information processing and possibly adaptive reaction, or whether the status quo can be maintained and ongoing activity continued.
2. *Emotions have a motivational component.* In most cases emotion-evoking events require the organism to react, which often implies suspending ongoing behavior and engaging in a new course of action. Therefore, emotions have a strong motivational force and produce states of action readiness (Frijda, 2007a) that help the organism to adapt to or deal with important events in their lives.
3. *Emotions engage the whole person.* Because of the importance of the event, the action readiness engages the entire person – it urges action forward and/or suspends action. In consequence, it is often accompanied by preparatory tuning of the somatovisceral and motor systems, which may lead to a synchronization of components such as attention, appraisal, action tendencies, somatovisceral changes and expression (Scherer, 2001).

4. *Emotions claim priority.* Emotions bestow a precedence of control on states of action readiness, in the sense that they will claim priority in the control of behavior and experience. This is done by implementing all the emotion components through the synchronization process referred to above. Emotions are persistent over time and block other claims for attention and the awareness of possible unwanted consequences of the instigated actions.

It can be argued that these four determinative features jointly define what is generally meant by emotion, both in lay and scientific terminology. Based on these commonalities a ‘design-feature’ approach proposed by Scherer (2005a) can be used by differentiating emotions from other types of affective states or dispositions such as preferences, moods or attitudes. Emotions are *processes* that are: (a) focused on specific events (and thus always have an object); (b) involve the appraisal of intrinsic features of these objects or events, of their conduciveness with respect to specific need or goals and of their compatibility with norms and values; (c) affect most or all bodily subsystems in a coherent fashion leading to an integrated mental representation of an episodic emotional quality; (d) are subject to rapid change due to the constant unfolding of many types of events and the resulting reappraisals of the potential consequences (which in turn change the response pattern); and (e) have a strong impact on behavior due to the generation of action readiness (although the actual behavior is also strongly determined by other factors, e.g. situational constraints). While this leaves us short of a formal definition, it does provide a framework that allows researchers to agree more readily on the nature of the phenomena under study.

Although identifying the agreed features of emotion is a step towards answering the question ‘When are emotions rational?’, to truly address the query there needs to be a model or architecture into which these features can be built. Given the preceding discussion, such a model should allow for different emotion components, and it should be dynamic in nature and process oriented, in view of the dynamic nature of most emotion-eliciting events. While many different emotion theories or models have been proposed (see Moors, 2009; Scherer, 2000, 2010, for overviews and references), there are three major contenders:

1. *Discrete or basic emotion theories* (Ekman, 1992; Izard, 1977; Tomkins, 1984) assume that there are a limited number of basic emotions that trigger affect programs elicited by certain types of events.
2. *Dimensional theories* see the basis of emotion as a position in a two-dimensional (valence by arousal) affect space (e.g. Russell, 2003) and often explain the existence of specific qualities of an experienced emotion in a constructivist fashion (the individual’s cognitive interpretation of the environment, bodily feedback or the act of verbal labeling of the experience).
3. *Appraisal theories* focus on the complex evaluation of the eliciting event, the results of which are assumed to drive the emergent response patterns, allowing for a large number of highly differentiated emotions (Ellsworth & Scherer, 2003; Roseman & Smith, 2001; Scherer, 1999; Schorr, 2001).

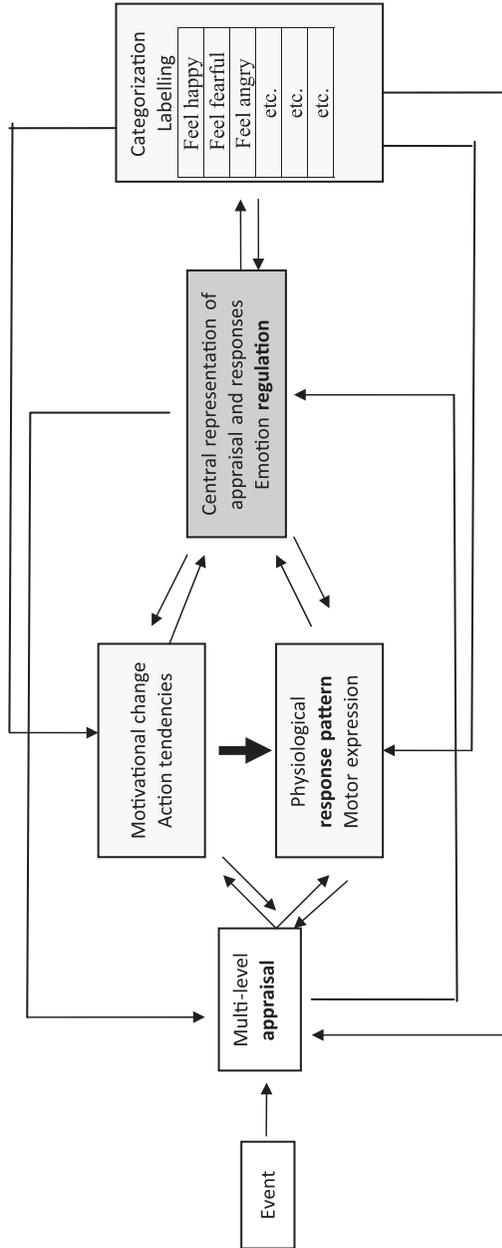


Figure 1. Architecture of the Component Process Model

Appraisal theorists attempt to model the agreed features of emotion described above in a principled fashion allowing for concrete predictions. I believe that only componential appraisal models allow examining the question of whether, and if so when, emotions can be considered as rational. The reason is that only this family of models provides a sufficiently detailed account of the underlying factors and mechanisms to allow an evaluation of whether the criteria of the three types of rationality are met or not. The author's theoretical model in that tradition is the Component Process Model (CPM), which specifically focuses on the dynamic unfolding of emotion (Scherer, 1982, 1984, 2001, 2009). The architecture of the model assumes changing and recursive emotion processes that follow events highly pertinent to the needs, goals and values of an individual. Emotion is seen as a reaction to significant events that prepares action readiness and different types of alternative, possibly conflicting, action tendencies. As mentioned above, emotion is rarely a sufficient cause for carrying out actions but it very rapidly prepares the organism for different types of action (see also Frijda, 2007a). Thus highly impulsive behaviors such as aggression or flight are strongly prepared by emotions such as anger or fear but their actual execution is multiply determined, with emotion being only one, albeit potentially important, factor (in addition to situational and normative context and strategic choice).

The emotional process is considered to consist of a number of components (see Figure 1). The first is the appraisal of the stimulus, the following two, operating in parallel, are action tendencies and physiological/motor changes. These three components are integrated into a central mental representation, which can be categorized and labeled. The central representation of the emotional process is the basis for *emotion regulation*, which constantly feeds information from the different components to each other and serves to maintain homeostatic equilibrium in the organism and to keep the emotional response within the confines of cultural norms and expectations, or adapt it to strategic interaction aims. To simplify the argument, this article will conflate components of action tendencies, physiological/motor changes and categorization/labeling into one 'response' component. Therefore, I will be considering the three aggregated emotion components of appraisal, response (bodily symptoms, action tendencies and expression) and regulation.

I use the CPM model outlined above to address the central question: When are emotions rational? By considering the three forms of rationality proposed above (functional, intellectual and reasonable) and the three aggregated components of emotion, I argue that emotions can be rational in the sense that the components of the emotion process described in the CPM fulfill at least one of the definitions of rationality, if not all three.

Below, I briefly review the three components and systematically examine the conditions under which their operation or output can be considered to satisfy one or more of the three rationality criteria. I illustrate my claims with a concrete example of a frequently encountered emotional situation: Imagine that you are late for an appointment in town and that you have been desperately trying, for the last 20 minutes, to find a parking space. You finally see a spot not far away and you race over to it. Just as you are trying to pull in, another car, coming out of nowhere, tries to do the same thing and blocks you. You are likely to experience – and express – some sort of emotion.

3 Appraisal component

The CPM suggests that the event and its consequences are appraised by multiple levels of processing. According to the model, four major appraisal questions need to be answered to allow us to adaptively react to a salient event: (1) How relevant is this event for me? Does it directly affect me or my social reference group? (relevance); (2) What are the implications or consequences of this event and how do they affect my well-being and my immediate or long-term goals? (implications); (3) How well can I cope with or adjust to these consequences? (coping potential); (4) What is the significance of this event for my self-concept and for social norms and values? (normative significance). To answer these questions, the organism evaluates the event and its consequences on a number of criteria or stimulus evaluation checks (SECs) such as the event's novelty, its urgency and its discrepancy from the expected.

It is important to note that appraisal does not necessarily require a complex cognitive calculus but often occurs in an automatic, unconscious and effortless fashion (Scherer, 2005b). Recent research using functional brain imaging in human subjects has provided evidence for this. It has shown that the activity of low-level neural areas such as the amygdala, which performs sensory processing and attention functions, can be modulated by the personal relevance of stimuli. This indicates the amygdala plays a crucial role in providing signals on auditory and visual sensory pathways, which can influence the representation of emotional events, especially when related to threat (Sander, Grandjean & Scherer, 2005). In these cases the checking mechanisms are mostly genetically determined and involve appropriate templates for pattern matching and similar mechanisms (cf. the notion of 'biological preparedness', e.g. for snakes, Öhman, 1986; or baby faces, Brosch, Sander & Scherer, 2007). The schematic level of processing involves checking mechanisms that are based on memory traces from social learning processes and they occur in a fairly automatic, unconscious fashion. At an associational level, involving various cortical areas, checking may occur automatically and unconsciously or in a deliberate, conscious fashion. Finally at the conceptual level, which involves propositional knowledge and underlying systems of cultural meaning, checking requires consciousness and effortful calculations in prefrontal cortical areas. The different levels continuously interact, producing top-down and bottom-up effects (see Leventhal & Scherer, 1987; Power & Dalgleish, 1997; Scherer, 2005b; van Reekum & Scherer, 1997). The appraisal component of the CPM thus affords an interactive approach that does not negate level constructs such as neural, schematic, etc., but does consider the interaction of unconscious and conscious processes between and within these levels.

Next I examine, separately for each of the three rationality criteria, the appraisal component likely to generate output that can be considered as being conducive to a 'rational' emotional response.

3.1 Functional (or purposeful) rationality

Functional rationality focuses on the degree of goal attainment in a situation. In our example outlined above, the immediate and salient goal is to park the car. Anger may

allow you to achieve your goal by preparing you to convince the other person to back down and give the parking space to you (as the other person might not want to get involved in a confrontation). In contrast, sadness may not help you to attain this goal (unless you succeed in arousing the pity of the other driver). Thus the functionality of the emotion depends on how competently you have appraised the situation, including the needs, goals, beliefs and likely reactions of the other.

We can distinguish two facets of appraisal competence: (a) appropriate emotion elicitation and (b) appropriate emotion differentiation. Appropriate emotion elicitation, on the one hand, refers to the ability to rapidly detect significant objects and events that require an emotional response, i.e. the event of seeing a free parking space. Detecting that something is important is the first, and possibly the most essential, step because we are constantly bombarded by stimulation and we have to decide how best to allocate our attention. In the above example the importance or relevance could depend on the importance of the appointment for which you are going to be late. Appropriate emotion differentiation, on the other hand, is the ability to distinguish different emotional reactions that could occur in the situation. It is one thing to react emotionally when it is required, another to react with the appropriate emotion. The process of differentiation preselects different alternatives for action readiness, and incompetent appraisal may lead to a preselection that could produce an emotion that can be considered irrational in the functional sense, such as sadness in the example. By combining appropriate emotion elicitation and appropriate differentiation, appraisal can fulfill the criteria of functional rationality. In our example, appropriate (or competent) appraisal consists of correctly evaluating and predicting the other person's perceived entitlement and power feelings, including his or her likely reaction to our own emotion display.

3.2 Intellectual (or inferential) rationality

This criterion requires that the emotion be based on cognitive inferences and evaluations of the situations that do justice to the nature of the event and its implications. In our example, this criterion would not be met if you were to blow your top upon first sight of the other car. In order to fulfill the criterion, it is necessary that a series of cognitive operations (which could be executed on different levels of consciousness or control, as discussed above) allow the best possible inference from the available facts, under the given time constraints.

The CPM proposes that appropriate emotion differentiation requires evaluating the implications of an event in a realistic fashion, including a correct estimation of one's coping potential. The CPM suggests that this is achieved by a sequence of stimulus evaluation checks, many of which are highly cognitive and inferential in nature (Scherer, 1984, 2001). The results of the checks reflect the organism's subjective assessment of consequences and implications of action against a background of personal needs, goals and values (for further details and references, see Ellsworth & Scherer, 2003; Sander, Grandjean & Scherer, 2005; Scherer, 2001, 2009). The operation of such SECs can be interpreted as fulfilling the criteria of inferential/intellectual rationality in that it is a form of cognitive evaluation, albeit one that can occur at a

more unconscious level (see the work on non-declarative or unconscious learning; Knowlton, Mangels & Squire, 1996).

But this rationality criterion is satisfied only under certain conditions. The results of SECs may well be unrealistic or biased. One prerequisite for accurate appraisal is to evaluate each event on its merits and to avoid being influenced by evaluative biases or stereotypical judgments (for example, a self-serving bias with respect to causal attribution, i.e. tending to blame others). These biases can lead to irrational emotions in the intellectual sense by placing greater importance or priority on a SEC than it warrants. In the car-parking example you may consider the SEC of urgency as more important and rely on that more than let's say the SEC of outcome probability. As such, your emotional reaction may tend more towards anger when the parking place is contested since this would seem appropriate in the light of your biases.

We can also illustrate this with a more empirically researched example. The findings of a large-scale actuarial study of daily emotions show that, if one has a stable disposition to experience a certain emotion, one is more likely to experience that emotion on any given day (Scherer et al., 2004). I suggest that, in large part, this is due to the operation of appraisal biases. Thus when one is somewhat depressed, one is likely to appraise events pessimistically, perhaps due to a bias of prioritizing or relying more on the SEC of intrinsic unpleasantness. This will increase the probability that one will experience sadness or anxiety.

However, even a clinical diagnosis might not always imply complete lack of rationality. Thus researchers have reported that depressives may judge events more realistically than optimistic individuals (Alloy & Abramson, 1988). Perhaps controversially one might suggest that a depressive appraisal bias is in fact a rational emotional reaction to today's world and the subsequent emotional response is competent in the current context. Applying functional or intellectual criteria, this is rational, but with respect to consensual rationality, it may border on the irrational.

3.3 Reasonable (or consensual) rationality

This criterion requires that observers of our emotion agree that it is justified given the circumstances, i.e. that given the norms and values of the society and the common expectations about situations of a given type, the emotional response seems comprehensible and acceptable. Thus if you throw a fit of violent rage upon realizing that your parking space is contested, many bystanders might consider such behavior as exaggerated or incomprehensible, and thus somewhat irrational. They might even wonder whether you suffer from a tendency to emotional disturbances.

The appraisal of appropriateness or acceptability is often based on the adverse consequences of non-adaptive or inappropriate emotions, which in turn is based on the general social consensus of what constitutes 'abnormality'. In fact, the diagnosis of emotional disturbance is often made by a person's friends or family members, who feel that the person's emotional reactions are often inappropriate to the event that elicited them. Emotions such as pride, shame, guilt and anger require an accurate representation of social expectations, norms and moral standards. Inappropriate emotional reactions are widespread and may even become chronic in the form of affective disturbances.

Affect disturbances can be explained by the CPM in terms of ‘abnormal’ results of the various SECs (Scherer, 1987). Thus people with an unrealistically low level of self-esteem and coping ability are likely to evaluate stimuli or events with a belief that they have a low level of control over situations (corresponding to SECs of control and/or power) when in reality they have more control than they think. This produces feelings of anxiety or depression that are regarded as inappropriate or ‘abnormal’ by other people. Proceeding in this manner, one can take each of the checks, i.e. novelty, pleasantness, etc., in turn and describe the consequences of a malfunctioning of the checking process due to incorrect criteria or to deficiencies in the underlying structures. Adopting this approach, one can identify possible links between dysfunctional checking processes and clinical syndromes (Kaiser & Scherer, 1998: Table 2; Roseman & Kaiser, 2001).

Inappropriate results of the SECs are likely to be due, at least in part, to either misattributions in terms of the causation and significance of an event or to incorrect criteria used in the checks. For example, in the case of parking the car it may be that you incorrectly gauged the significance of the person taking your space as representing that person’s direct intent to annoy you – ‘They knew I wanted that space.’ Or you may have incorrectly gauged the urgency of finding a space because in reality you had more time than you thought or the person with whom you were meeting would not have minded if you were a few minutes late. Any of these could lead to a more explosive emotional reaction than was appropriate to the situation and that would be seen as unreasonable or abnormal according to social norms or expectations.

Interestingly, the absence of a particular emotion can also be considered irrational if the emotion that seems to be required by a particular constellation of eliciting factors does not occur (cf. Aristotle’s convincing demonstration of the need to become angry when there is reason to be angry; *Ethica Nicomachea*, Aristotle, 1941: 996). In consequence, emotions can be and very often are rational in the sense of reasonable.

4 Response component

The result of the appraisal will generally have an impact on motivation, which changes the tendency for action. Based on the appraisal results and the motivational changes, effects will occur in the autonomic nervous system (in the form of cardiovascular and respiratory changes) and in the somatic nervous system (in the form of expression in face, voice and body). According to the CPM all of these components – appraisal results, action tendencies, somatovisceral changes and motor expressions – are centrally represented and fused in a multimodal integration area (with continuous updating as events and appraisals change). Parts of this central integrated representation may then become conscious and assigned to fuzzy emotion categories as well as being labeled with emotion words, expressions or metaphors (see Scherer, 2009, for further detail). For the purpose of this article the changes in action tendency and in autonomic and somatic nervous system and the expression and verbalization of emotion will be conflated into a ‘response’ component. We can now evaluate when a particular type of response can be rational with respect to one of the three criteria.

4.1 *Functional (or purposeful) rationality*

While emotion has evolved to serve adaptive functions, not all instances of emotional reactions to events can be considered functional, and sometimes emotions can indeed make problems worse rather than help us deal with the situation. Terms such as mindless fear, unfounded anxiety, disproportionate anger, etc., highlight situations in which emotions may be dysfunctional in producing a response to an event, as it does not match the end achieved to the means deployed. It should be noted, however, that ‘dysfunctional’ emotions can be functional in the short run. It has been pointed out that a fit of blind rage may well be functional in getting what one wants since others may yield to demands in order to have peace, fearing further escalation (see Nesse, 2009, on evolutionary functions of emotion). However, this may be dysfunctional in terms of achieving long-term goals such as promotion in a company or developing friendships. Similarly, for a child experiencing trauma, an emotional response (or lack of one) may be functional at the time, such as in dissociating from fear since this may be too overwhelming and make the child vulnerable in the situation. However, in the long run, this response may prove dysfunctional in adult relationships since the grown-up child who dissociates from an emotional response is not fearful in certain situations and actually becomes more vulnerable, the very opposite of the purpose of the original emotion. Hence an emotional reaction that was once functionally rational is now no longer rational.

4.2 *Intellectual (or inferential) rationality*

As shown in the CPM model (Figure 1), the response patterning depends very much on the outcome of the appraisal process, and response elicitation is highly determined by psychobiological factors (for example, the innate tendency to fight an obstacle to a goal), rather than by inferential, cognitive factors that operate mainly during appraisal (and in the regulation component described below). However, one potential competence of relevance is the categorization or labeling process, which I have conflated with the other response types for the purposes of this article. People have differential ability to perceive or finely categorize their types of feelings, which may be linked to inferential capacity. Furthermore, people have differential access to the pertinent vocabulary in their language, which may have an effect on the differentiation and appropriateness of labeling. Clearly gross categorization (and labeling) will be detrimental to fine-tuned regulation attempts as well as making it difficult to adequately communicate one’s feelings – all of which may limit the degree to which this rationality criterion is met.

4.3 *Reasonable (or consensual) rationality*

The claim that an emotional response can be right or wrong depending on the circumstances may strike one as unusual at first glance. Yet it is an obvious consequence of the generally accepted claim that emotions have evolved to help organisms adapt to situations that are pertinent to their well-being. What is the criterion for an emotion being inappropriate or unreasonable for a given context? The issue is complex, and I

can only briefly mention some elements of a response. One relatively clear-cut case is represented by emotionally disturbed behavior as found in anhedonia, euphoria, dysphoria, depression, panic attacks and the like. As discussed above, there is widespread social consensus that such enduring emotional response dispositions are signals of ill health and require therapy, indicating that the emotional reactions of the respective individuals are considered pathological or abnormal by society at large. One could argue that such clinical syndromes cannot be used to examine the appropriateness of emotions for 'normal' individuals. Yet the fact that in modern clinical practice a symptom count (i.e. the number of different 'abnormal' behaviors) decides clinical significance (e.g. DSM-IV, 2000) suggests that there may well be a continuum between somewhat inappropriate emotions and serious clinical disorders. In consequence, one can argue that one criterion for inappropriate or unreasonable emotionality is the family or peer judgment that a person's emotional reactivity is inappropriate. In the example in the carpark, if the person who took your space has a young child with them in the car, it may be that your emotional response of anger would be deemed unreasonable in the light of a familial belief that one should not display anger or threatening behavior in front of children. Of course it may be that family or peers consider an emotional response to be completely reasonable, and it is only when we leave this family or peer group that we find our responses to be irrational or unreasonable in a wider social context. This has implications for cross-cultural differences in the emotional responses that are considered appropriate (cf. Scherer, 1997).

5 Regulation component

One important function of emotion regulation is to prevent or modulate inappropriate emotional responses (e.g. in the sense of social norms or expectations) that might have been produced by biased appraisals or faulty SEC processing. Often our social environment will alert us to the fact that an emotional reaction is inappropriate in kind or intensity. Given a certain sluggishness of the response system, especially physiological arousal, emotions cannot be turned on or off like an electric light, and control and management strategies are required. One might think that emotion regulation skills are not needed if one commands exceptional appraisal competence – in that case the emotions triggered by the appraisal results should always be appropriate. However, this is rarely the case.

Although the importance of emotion regulation is often underlined, relatively little is known about the details of the underlying mechanisms (but see the contributions in Philippot & Feldman, 2004). Based on the layers of feeling and the role of consciousness and verbalization shown in Figure 1, I suggest that several determinants of regulation need to be differentiated. A major determinant is appropriate monitoring of the emotion process, which I define as consisting of three parts: (1) appropriate reflection and integration of all emotion components, (2) balanced conscious and unconscious processing, and (3) accurate proprioceptive feedback of peripheral responses to a central monitoring system and their appropriate interpretation. Basically the idea is that the integration processes across different modalities and across time (of appraisal results and the corresponding response patterns; see Scherer, 2004), as well as the interaction between

unconscious and conscious processing (see Scherer, 2005b), can operate in a more or less optimal manner. I propose to refer to this as *monitoring competence*.

Returning to our example in the carpark, let's say your response is to get out of the car and start shouting at the person who has taken your space while knitting your brow and going red in the face. Let's also say that you have a companion with you, who is trying to calm you down. When they do this, your response is to shout, 'I am not angry. This person is just wrong.' This would seem indicative of a certain lack in monitoring competence, implying incomplete proprioceptive feedback from major expressive channels and incomplete integration of appraisal and response information, including incorrect labeling of the emotion. The result is an absence of timely emotion-regulation attempts, both on the unconscious and the conscious levels, which may have negative consequences in events that follow.

Once the need for emotion management is established, based on appropriate monitoring, then functional regulation and control strategies need to follow. These come in two types: automatic unconscious regulation and controlled conscious regulation. The former involves allocating attentional resources, and I suggest that, when this is not working efficiently, impulsive behavior is likely to occur. Whiteside & Lynam (2001) identified four components of impulsive behavior: urgency, (lack of) premeditation, (lack of) perseverance and sensation seeking. Although empirical proof is currently lacking, at least the first two components might be directly linked to attention difficulties that limit the capacity for efficient automatic regulation of the emotional processes. In any case, the deleterious effects of impulsivity on emotion regulation, in particular anger and aggressiveness, are well known and empirically documented (e.g. Hoaken, Shaughnessy & Pihl, 2003; Scarpa & Raine, 2000).

Conscious regulation refers to reaction suppression and control attempts, which change the subjective feeling qualitatively and quantitatively. In particular the work of Gross and his associates (Gross & John, 2003) has demonstrated the effects of reaction suppression and cognitive reappraisal. In our car-parking example this might be manifested as attempts to stop shouting, frowning and going red in the face, perhaps by deep breathing (suppression) or attempts to reevaluate the entitlement of oneself and of one's opponent to occupy the parking space. This would then change or perhaps lessen the intensity of the anger.

How can incompetent regulation threaten the rationality of an emotional response?

5.1 Functional (or purposeful) rationality

By its nature the component of regulation involves functional rationality since it is the goal or function of the emotion that is ultimately guiding the regulation process. Regulation involves constantly adjusting the emotional response in line with the goal or purpose of the emotion through feedback loops between the different components of the CPM. Broadly speaking it can happen either by adjusting the actual emotion itself qualitatively (fine-tuning) or by changing the intensity of the emotion quantitatively (adjusting the volume of the emotion). Returning to our example of displaying anger in the carpark, if you realize your outburst is not getting you what you want, i.e. getting the other person to relinquish the space, you may increase the intensity of your anger

perhaps with the aim of intimidating the person into giving you the space. Alternatively if it appears anger is not fulfilling its purpose, however high the volume, you may change tactics and show another type of emotion or 'tint' your anger with another emotion such as sadness or desperation in order to arouse guilt in the person.

Of course it may be that during the event, the goal or purpose itself changes. For example, your goal may become showing your ability to get what you want, showing off your status or saving face, rather than parking the car; and regulation is the process by which this is fed back into the different components of emotion.

5.2 *Intellectual (or inferential) rationality*

In the CPM appraisal is an ongoing, recursive process with constant reappraisals occurring due to new incoming emotion, recall of former experiences or changed evaluations. If constant recursive appraisal, and consequently constant reappraisal, is part of the normal emotion process, what is the effect of emotional regulation efforts in this process? This issue has not really been addressed so far, either on the theoretical or the empirical level. I would argue that regulation efforts would result in highly effortful, controlled and directed appraisal processes, with the individual consciously searching for interpretations of events and potential implications that are more beneficial than the first evaluation seemed to suggest.

The effect of reappraisal has been posited from an early time and empirically demonstrated by Lazarus and his collaborators (Lazarus, 1968, 1991). If the results of appraisal determine the nature of the ensuing emotion, a reappraisal will obviously change the nature of the emotion and consequently the subjective feeling. Modern componential theories, and particularly the CPM, conceptualize appraisal as a recursive process. In consequence, rather than focusing on single acts of reappraisal, these theorists envisage a constant effort to refine appraisal results and bring them into line with reality. This is achieved by continuous processing of incoming information and continuous search for the most appropriate schemata or criteria by which to compare currently experienced events and their features to internally stored experiences. The result is a constant change of the qualitative nature and intensity of the resulting emotion (and its subjective experience), something that the notion of emotional states, in the sense of a few basic emotions, hardly does justice to.

A good example of this type of reappraisal strategy is wishful (or highly optimistic) thinking, a regulation strategy that consists of systematically overestimating the probability that appraised causes and consequences of events are in line with an individual's desires. Wishful thinking serves to minimize the impact of threatening events and/or embellish the hopes for positive outcomes. The example suggests that emotion regulation may be closely linked to the activity of coping with events and the emotions they arouse. Given this affinity, it is quite surprising that there seems to be little contact between the coping and emotional-regulation literatures. This is unfortunate, as there are strong links on the level of conceptualizations and mechanisms. Clearly both reappraisal and the inhibition of reappraisal are coping strategies, as is the suppression of emotional reactions and some of its manifestations by a variety of different control strategies.

5.3 Reasonable (or consensual) rationality

As mentioned above, regulation requires varying the intensity and form of emotion. As appraisal changes rapidly, abrupt reappraisal as a result of new information requires strong regulation skills. In addition, emotional reactions are subject to strong normative control in most societies, and this must be considered in the regulation process. Thus, even though a strong anger reaction to a veiled insult may be an appropriate behavior preparation in an evolutionary sense, rules of politeness may prohibit such reactions. Many authors have described the existence and operation of display and even feeling rules in different societies (Ekman, 1972; Ekman & Friesen, 1969; Hochschild, 1979; Matsumoto, 1990). Although not empirically proven, in our example in the carpark, it is likely that people would behave differently depending on their cultural background and the social rules that govern the expression of certain emotions in public. Except in the case of extremely impulsive reactions, the danger that a decision based on emotion-generated action tendencies may lead to catastrophic consequences tends to be minimized by the operation of strong emotion control and regulation mechanisms.

6 When are emotions rational?

We can now return to the question posed at the outset: When are emotions rational in the sense of functional, intellectual and reasonable? It could be argued that, if emotions are often likely to be inappropriate in a given context, either due to dispositional biasing factors or faulty appraisal of a situation, as shown above, they may well lead us astray in judgments and decisions. This would bolster the view that it is better to engage in rational analysis of a situation, the weighing of alternatives and informed choice of the most promising course of action. However, such a conclusion is erroneous due to the lack of existence of ‘perfect rationality’ in the real world, as discussed above.

I have argued in this article for the evolutionary origin of emotion, making it an extremely flexible adaptive mechanism in the service of coping with a multitude of relevant events in changing environments. This should therefore provide an ideal basis for judgments and decisions that have to be taken rapidly and in the absence of an opportunity to gather additional external information. Making decisions and initiating actions based partly on emotions is a good compromise taken under time and information constraints imposed by the boundaries of the real and imperfect world. Often emotions occur in contexts where this is the case; but if there is no urgency and additional information can easily be obtained, any initial emotions may rapidly fade away. If there are strong emotions and decisions need to be taken very rapidly, emotions provide a rational (in the sense of functional, intellectual or reasonable) basis for decisions. However, this is only so if the emotion appraisal is appropriate and correctly reflects the significance of the event for the person in terms of relevance, causation, consequences, control and power, and normative implications. Given the evolutionary success of emotion, this is likely to be the case unless there are individual malfunctions such as appraisal biases or an impulsive personality structure that may produce inappropriate appraisal outcomes or prevent corrective mechanisms such as re-appraisal or

emotion regulation operating appropriately. However, this does not mean that the component processes themselves are not rational in the three senses of the word that I have proposed above.

Although I have criticized the deleterious effects of Plato's distinction of the tripartite soul, I seem to have added two three-way systems of my own: three forms of rationality and the three components of emotion (although the response component is a conflation of several subcomponents). However, more than Plato's categorization, I believe that it is the assumed exclusivity between the categories that has obstructed progress in the study of emotions. It is by considering the elements, or criteria, of rationality and the components of emotion, which include cognition, that I hope one can demonstrate how these two concepts previously considered to be exclusive can include each other in a dynamic and systemic way, trying to achieve an integration that does justice to the complexity of the underlying mechanisms. Such an approach can also provide suggestions or insight for when this occurs, i.e. when an emotion is functionally, intellectually or reasonably rational or fulfills all three criteria. Investigation of what happens when the different criteria of rationality come into conflict, for example when an emotion is functionally rational but not intellectually rational, may provide further insight into the unfolding of emotions and their expression.

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Author biography

Klaus Scherer studied economics and social sciences at the University of Cologne, the London School of Economics and Harvard University (PhD 1970). After teaching at the University of Pennsylvania, the University of Kiel and the University of Giessen, he has been full professor of psychology at the University of Geneva 1985–2008. He is currently the director of the Swiss Centre for Affective Sciences (CISA) at the University of Geneva. His research activities focus on the nature and function of emotion, in particular the study of cognitive appraisal of emotion-eliciting events, and of facial and vocal emotion expression. His numerous publications include monographs, contributed chapters and papers in international journals. He has edited several collected volumes and handbooks, and co-edits a book series on 'Affective Science' for Oxford University Press. He was a founding co-editor (with R Davidson) of the journal *Emotion*.