

RATIONALITY AND EMOTIONS (THE PERSPECTIVES OF LOGICAL-COGNITIVE ANALYSIS)

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BIBLID [0495-4548 (1999) 14: 34; p. 109-127]

ABSTRACT: This article is an extension of the author's previous work on this subject. Primarily it outlines the main directions of this mode of analysis and possible fields to which it could be applied. The first chapter demonstrates a specific method of understanding emotions. The second chapter examines the concept of emotions as a source of the specific modes of "internal" rationality of an agent. The third chapter is devoted to a comparison between various emotions and the two basic intentional states - belief and desire. The fourth chapter will present the instrumental typology of certain emotional concepts. The final chapter represents preliminary logical schema of the meanings of emotional concepts.

Keywords: emotion, rationality, cognitive mode, intensional logic.

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Traditionally, emotion has been viewed, particularly by modern thinkers, in opposition to reason. The general argument by the proponents of the emotion-reason dichotomy is that emotions, in contrast to thoughts, are not content-laden. In recent years, the emphasis on the lack of content in emotions has started to change to an acknowledgment of an opposite view, wherein emotion possesses content. As noted by J. Lackoff (1987), we have had to reject a basic Western thesis that emotions had no conceptual content. Efforts on the rationalization of emotion which consist largely in attempts to anchor it in thought, are bound to make an impact in both social

and cognitive sciences. Rationalized emotion can contribute to a more precise and complete understanding of the factors underlying personal and social choices. Moreover metaethics will benefit from rationalized emotion by admitting it as a long sought after link between thought and action.

Logic holds interest of its own in emotion thus conceived. The formal theory of emotion undoubtedly contains a major addition to the logic of practical reasoning. The task of logic in the study of emotion is twofold. Firstly, it can determine the definitional means for representation of the content structure of emotion. Secondly, it can design models to mirror the structural properties and objects in the worlds created by the experimental study of emotion. Since emotions are not causally independent from other cognitive states, logical analysis of emotion is also a sort of cognitive analysis. The cognitive part of the analysis serves to limit its object so that it includes only those states that matter causally to emotion. It is the venue of logical-cognitive analysis to construe emotion as indicative of an internal mental processes. Emotion may bridge gap between one's mind, body, and social milieu. It has, so to speak, a potential for bringing together such diverse aspects of action as subjectivity, reality, and normativity.

If the union of thought and action is the function of emotion, what then is the object of emotion's function? To find out, we will have to closely examine human rationality; specifically its internal cognitive structures supervient to emotions.

1. *Emotion*

We share the basic assumption behind the cognitive theory of emotion that emotions are produced by certain kinds of cognitive activity.

Emotions are very real and very intense, but they still issue from cognitive interpretations imposed on external reality, rather than directly from reality itself. It is in this sense that we claim that there is an essential and profound cognitive basis for emotions (Ortony 1989, p. 4).

Opinions regarding the nature of the cognitive causes of emotion can be divided into three major categories. Some philosophers believe that emotions are influenced by evaluative judgments (see Solomon 1977). The second group believes that emotions find their source in desires and beliefs (cf. Searle 1983). Finally, Lazarus (1992) suggests that neither beliefs nor desires can be immediately responsible for bringing emotions into being. He conceives of such beliefs and desires merely as customary ways to describe the cognitive models we possess of reality. The cognitive models

work on external/internal data to produce an interpretation of an event with emotion as the event's valuation. Emotion can then be considered as an appraisal of the event determined by an agent's cognitive archetype. The valuation can have differing degrees of complexity depending on the subject of evaluation (a physical event, an intentional action of another agent or its side effects, etc.) and different valences (positive or negative). These valuations possess a fixed character which reveals itself in the fact that they can be applied only in situations with a number of common elements (Reikowskij 1969).¹

This paper is not meant to be an inquiry into the necessary and sufficient conditions for the origin of any particular emotion or emotions. The purpose is to outline the formal structure of the complex evaluative process involved in the experience of any of the emotions. The questions which require answers are

- (1) How is the valence of an emotion to be represented formally?
- (2) What are the formal differences between different emotional states and of what do they consist?
- (3) How is this difference to be presented?

We will return to these questions later.

Before that, however, we must amplify our preliminary definition of emotion as valuation. Those writing on emotion, when constructing its definition, usually take two of the emotion's functional roles -evaluative and motivational- as the bases of its construction. In accordance with its evaluative role, emotion imposes a value on a state of affairs. Its motivational role consists in brining about action. The latter function, however, is susceptible to counterexamples. For instance, it is hardly news that identical emotions, when experienced in different situations, may not entail identical actions. In one situation a certain emotion can serve as an impetus to an action, whereas in another we may scarcely notice its presence.

One way to avoid the thrust of such counterexamples in rationalizing motivational function is by assuming that an emotional state represents the fixed scenario. This scenario may or may not include proscriptions as to the retaliative action(s) and/or the tendency to act. The scenario ought to include an inventory of the agent's beliefs about reality, a list of action/outcome possibilities open to him/her as well as to others, a system of expectations, beliefs about limitations engendered by society, and other such tangential considerations.

Delineation of emotion's general functional role does not, however, complete the definition. We also need to specify its functional role with respect to other components of action. Slightly revamped from its original Aristotelian form by the contemporary logic of practical reasoning, the practical syllogism takes: the statement about a goal of action as its major premise, the statement about means as the minor, and the statement of intention (or in terms of teledeontical-logic (Ishmuratov 1987) duty to act) as the conclusion. Our suggestion is that emotion should occupy a determinate functional niche with respect to the goal, means and intention of (inter)action. Without further ado, let us then define emotion as the evaluative mental state actualizable in one's (inter)action, whose functional role within (inter)action's structure is strictly determined.

So far we have dwelled on the relationship between emotion and action revealed by emotion's ability to motivate action. Additional analysis demands clarification of the evaluative nature of emotion and of the formal means for its representation. Since an emotion in itself is already a complex evaluation fixed in some way, a question about the usefulness of the attempts to define its rationality arises. An emotion is a manifestation of the "inner" rationality of an agent - a manifestation of the agent's ideas about reality, of its necessity, and of his or her desires and expectations. To evaluate an emotion in itself as an "appropriate manifestation" of a particular state, one must employ a meta-evaluation. This meta-evaluation can be realized by another agent within the scope of mutual activity. Here, the answer to the question "Why are emotions such that it is difficult to evaluate them from the standpoint of a single criterion or standard of rationality?" is not readily accessible.

2. *Rationality*

Emotions and beliefs share certain common features. As noted by R. de Sousa,

Three sorts of considerations link emotions directly or indirectly to rationality: our confidence in judgment of reasonableness, the use of emotions as excuses and justifications, and the thought-dependency of most emotions (de Sousa 1990, p. 5).

The contemporary debate on rationality of emotion, notably of the source of its rationality, has produced several options worthy of consideration. One of these expresses skepticism on the possibility of any degree of rational emotions that is different from causal rationality. According to this

view, an emotional state is a function of its causal dependence upon beliefs (desires). Having reduced emotion's rationality to the rationality of its causal source, this doctrine focuses on penetrating into this source with the purpose of establishing a causal basis for each particular emotion. We tacitly accept the contention that emotion is rational with no intention, however, to endeavor to attribute a causal nature to its rationality. In our opinion, the project of determining causal dependencies of every particular emotion is fraught with difficulties, some of them insuperable. The primary obstacle reveals itself in the inability of cognitive scientists to provide a general proof of the obtainability of the relation of necessitation between belief (desire) and emotion. In this connection, R. Solomon (1988) points out that "neither satisfaction nor frustration of a desire leads to the appearance of emotion by itself".² The failure to trace emotion back to its alleged causal source encourages those examining the issue to introduce significant modifications in the character of the causal source itself by substituting beliefs and desires with "paradigm scenarios". If required, the paradigm scenarios will assume the role of the causal basis whereas beliefs and desires will be confined to the role of descriptive devices.

Apart from its vagueness, the concept of the paradigm scenario provides no assurance that the connection between a certain emotion(s) and the paradigm itself is more than just a contingency. Furthermore, the concept has no provision to preclude epistemic errors such as assigning a connection between an emotion and a scenario where in reality none exists. In response to this failure, de Sousa introduced the Principle of Emotional Continenence: "Let your emotions be appropriate to the widest possible range of available scenarios" (de Sousa 1990, p. 337) The breadth of scope thus required, however, defeats the entire purpose of using paradigm scenarios to formalize a causal basis for emotion in the first place.

All this casts serious doubt on the prospect of the rationality of emotion with respect to causes. In examining the possibility of the rationality of emotional states with respect to the effects of action, de Sousa identifies rationality with effectiveness. Effectiveness in turn is defined in terms of the utility of an action's outcome. R. de Sousa argues that we arrive at the strategic rationality of emotion. Emotion can also be cognitively rational: "a state is cognitively rational if it is arrived at in such a way as to be probably adequate to some actual state of the world that it purports to represent" (de Sousa 1990, p. 337). Our general objection to the concept of strategic rationality is that in ascribing a certain degree of effectiveness to an emotion, we falsely assume that the ascription touches upon the emotion

itself. In reality, we just evaluate the outcomes of the associated action or qualify an intention or both.

What does it mean for an emotion to be cognitively rational? It means to ground itself on a true belief. Hence, if such belief is false then the emotion is not rational, though it could be rational in the strategic sense as something that guaranteed the achievement of a goal. But would that action be an intentional one? And again, no agent can decide, whether a belief reflects an actual state of the world adequately, only an observer can do this. An agent itself can make mistakes and he/she will or will not be able to understand it later. The question is whether it is possible to describe exactly the conditions when an emotional state is rational or not. The idea that emotions require a special mode of rationality has been claimed by a number of philosophers. Thus, de Sausa (1990) proposed to consider a paradigm scenario (a situation in which the meaning of the emotion has been researched) as a criterion of the rationality of the defined emotional type. T. Scheff (1992) has introduced a term substantive-formal rationality.

The common feature for these modes of rationality is that, on the one hand, they propose some strong structure (closure "formal", the notion "scenario", etc.) and, on the other hand, they point out the direct (natural), informal character of an emotion. We consider that emotions provide a flexible mode of rationality. It is well known that agents really act in imperfect situations with limited resources, incomplete or surplus information, and without any hierarchy in goals, or even reciprocally. Emotions very often help an agent avoid a lot of difficulties and mistakes because they propose a fixed scenario, a way of reasoning or behaving. On the other hand, people often commit the deadly mistakes because of the same capacity of emotions. We suggest it is necessary to describe the scenario associated with the given emotion and to explicate the structure of the underlying cognitive evaluation in order to answer the question. What is the difference between our evaluations while we are afraid, danger, glad, jealous and so forth? The complexity of this evaluation in the first place depends on the fact that an emotion is not only a psychological or even physiological phenomenon, but also a social and depending on the culture one. According to K. Oatley (1992) emotions are our biological solvers for deciding our social problems.

According to descriptive theory rationality is an agent's ability to keep "a balance" among his/her epistemic and goal attitudes, as the property constituting the agent. The task of the normative theory of rationality is to

describe the conditions which have to be met in order to evaluate agent's actions and reasoning as rational or non rational ones. In both cases, the demand of consistence, non-contradiction and also effectiveness is advanced in one or other way (even if they are minimal) (Cherniak 1992). The specific of an emotion is that it guarantees the unity of person's linking descriptive and normative aspects of rationality and manifests the schemes of his "internal rationality".

It could be said that an agent is rational when he/her is consistent and effective at the same time, and his/her emotions are the manifestations of the "internal" standards of his/her rationality. Strictly speaking, emotions are different modes of rational evaluation. For example, different agents can display different emotions depending on their "internal" standards of rationality (their own ideas about normativity, desires and believes) concerning the same event.

Take the simplest example. It is raining. X is *glad* that it is raining because it is useful for a future harvest. Y is *pained* that it is raining because he was going to BBQ party and now the party will be canceled. In the first case the event "it is raining" is evaluated as a rational one because in some way it promotes the realization of X's plans, agrees with his system of believes and desires. In the second case the same event is evaluated as a non rational because it has broken Y's plans and his system of hopes. We can assume, for example, that so called negative emotions are perceived as non-rational ones while positive emotions are perceived as rational ones. Though in fact the schemes of the "inner" rationality of an agent are much more difficult.

In cognitive terms the evaluation "rational" require a standard by which a reasoning, an action and event can be evaluated. In the case of emotions this standard is the set of believes and desires that describe the scenario proposed by the emotion given, structured in a certain way. For every emotion this scenario is a single one and we can assert every emotion is a separate mode of the "internal" rationality of agent. Thus, one set of emotions consists the rational evaluation of some events or state of affairs (for example, *joy, hope, proud*). Another -the non-rational evaluation (*fear, anger*). It is also possible to mark out the class of emotions evaluating events as irrational ones. In the case these emotions say us that the meta-standard constituting the situation as a whole is broken. It takes place in situations when an agent cannot evaluate an event (or most often other agent's action) as a rational or non rational one at all. For example *anger* which consists an

evaluation of other agent's action as such that brakes the system of common expectations, and refuses further mutual actions.

3. Emotions and intensional modes

The logical properties of an emotion are the most salient if it is taken as an intentional state. According to J. Searle (1983) it can be represented as $S(p)$, where S is some intentional mode (corresponding to certain psychological state), and p is a representational content that can be expressed by whole proposition. However proper emotions as intentional states³ have some peculiarities: (a) they are also conscious states (it means that agent realizes clearly psychological mode and propositional content); (b) they have whole proposition as their object; (c) they have not their own specific kind of direction of fit. This conception of an emotion will be developed in the paper so far as logic deals with things that can be represented explicitly and in thus should be conscious.

Most writers try to argue that emotions are neither beliefs nor desires nor can they be reduced to some combination of beliefs and desires. We can see however that the same writers often represent emotions in such a way. That is why our strategy will be as follows: not to deny this fact at all, but -on the one hand- to catch the likeness and the differences between these intentional modes in order to work out more sophisticated way of representing emotions in terms of beliefs and desires, and -on the other hand- to discover the conditions of satisfaction of emotions (if there are any).

According to Searle, the intentional content determines the conditions of satisfaction if the content is a whole proposition and there is a direction of fit (Searle 1983, p. 12). Thus, the problem is whether an emotion has its own conditions of satisfaction, and, if it has, what they are. Since we have assumed that propositional content of an emotion is completed by the propositional content of beliefs and desires, we can suppose that direction of fit of the emotion depends either on directions of fit both beliefs and desires or only on the one of them which is in this respect essential.

Belief is a propositional content represented in a certain psychological mode. This mode determines a mind-to-world direction of fit, so belief is supposed to correspond to the world. The propositional content determines the set of conditions of satisfaction of the intentional state in question. In the case of belief it can be truth conditions. These conditions are

provided by non-instrumental backward-looking reasons suggested to present things as independent on mental state.

Desire exhibits a world-to-mind direction of fit, because the world is supposed to conform to desire in order to satisfy them. Desire has to be supported by instrumental practical forward-looking reasons that allow us to think of its satisfactions as good (Searle 1983, Greenspan 1995a).

Everything is more complicated in the case of emotions. Searle suggests that intentional states like *hope*, *fear*, etc. do not have the direction of fit at all. Therefore, they cannot have the conditions of satisfaction of their own, and hence cannot be evaluated like true or false, good or bad. The conditions are determined to some extent by desire that is an essential component of an emotion.

(...) All (except expectation) of the cases we have considered, as well as disgust, joy, panic, etc., seems to be more or less strong forms of negative and positive desire given or presupposing a belief (Searle 1983, p. 33).

P. Greenspan argues that emotions can be regarded by analogy with belief warrant so they determine not null direction of fit but variable mind-to-world one:

(...) to that extent that their representational function incorporates reference to forward-looking practical reasons along with the sorts of backward-looking reasons that constitute evidence (Greenspan 1995a, p. 134).

In the development of these ideas, emotions have been viewed in rational terms as appropriate or inappropriate, i.e., as fitting precisely a certain context or not. In that case we cannot avoid the question about the criteria of appropriateness. As Greenspan put it: "(...) it may not be clear that an emotion that fails to fit the world is rationally deficient" (Greenspan 1995a, p. 132). Indeed, it is possible to imagine situations where the appropriateness of an emotion can be defined by the truthfulness of belief or the conditions of satisfaction of a basic desire. There are cases where the conditions are transparent enough but often it happens just by chance.

If belief fails to correspond to the world, it is false. If the state of affairs (world) fails to conform to the desire, it cannot be satisfied. What has happened in the case of emotion? In which sense can an emotion correspond to the world? Probably it is possible only to the extent to which an emotion is based on true belief. However, this condition alone does not provide the appropriateness of the emotion. In what sense can the world

conform to the emotion? In the sense that there is a relevant situation for the satisfaction of the desire (or desires) involved in its structure. That is, the emotion itself needs no satisfaction. It does not require any conditions of satisfaction. An emotion itself cannot be true or false, good or bad, appropriate or inappropriate. What an emotion does, it indicates the relevancy of the beliefs and the desires to each other in some context.

The scheme proposed by Greenspan makes clear the mechanism whereby the emotional evaluation has been formed (not simply like conjunction of belief and desire), and mentions the way of forming the evaluative beliefs. However, it has no relevance to the conditions of satisfaction of emotions. It is possible to conclude that an emotion contains the possibility to fulfill the conditions of satisfaction of beliefs and desires which are structured in a certain way. Thus, a new mode of evaluation (emotional evaluation) has been constructed, and it is unique for each single emotion. So it is not a character of object that makes emotions what they are: *anger*, *fear* or *gladness*. On the contrary, the value of being fearsome or glad is ascribed to some piece of reality interpreted by a certain emotional pattern.

Intentional emotional states do not have the directness of fit of their own and it can be argued that they do not have the conditions of satisfaction of their own. How is it possible to evaluate, whether the state of fear is rational or not? Assume even that this feeling corresponds exactly to the situation where people are in. Can we assert that when such a situation arises, a person always has to fear? In our view all what we can say surely is that if a person fears something it means that he/she evaluates it as being fearsome. And this mode of evaluation can be represented as a certain combination of beliefs and desires or their more specified terms (intention, knowledge, belief, etc.).

4. *Typology of emotional concepts*

At the outset it is necessary to distinguish between an emotion proper as a psychological phenomenon, an emotional term that denotes this emotion, and an emotional concept that is a meaning of the emotional term. "A concept is a mental construct categorizing that (emotional) experience" (Oatley 1992, p. 77). To represent the structure of cognitive appraisal caught in the emotion we have to discover the structure of conceptual meaning of emotional term. This structure can be conceived as a scenario containing certain set of beliefs and desires.

It is important to define the meanings of emotional terms by analyzing several typologies, classifications and taxonomies. Most taxonomy of emotions have to do with Adam Smith's idea of moral sentiments. Thus, according to K. Oatley (1992) semantics meanings of ordinary language terms denoting the basic emotional modes have not to be interpreted within the cognitive system itself and do not depend on context. These modes are *fear*, *anger*, *happiness*, *sadness*, and *disgust*. A. Wierzbicka shows that semantic meanings of the terms referring to them have a more complicated structure. Hence they cannot be any kinds of primitives.⁴ For example, the meaning of *anger* includes the evaluation of another person's action and prescribes to act in return:

(...)
 This person did something bad
 I don't want this
 because of this, I want to do something
 I would want to do something bad to this person.
 (Wierzbicka 1992b, p. 303).

Whereas semantics meaning of *sad* indicates the tendency to avoid any actions:

(...)
 Something bad happened
 I would want: this didn't happen
 If I could I would want to do something because of this
 I can't do anything...
 (Wierzbicka 1992a, p. 558).

We can see that the structures of these concepts have different degrees of complexity. Therefore they can be attributed to different types of terms.

According to Oatley, the so called *causal emotional terms*, for example, *joy*, *sorry*⁵ have the simplest semantics, because the structure of their meaning does not include any complicated system of expectations or desires.

There are emotional terms with more complicated meanings in Oatley's classification: contextual and complex emotional terms. The meanings of the first ones depend on context. For example, *hate* denotes the mental state based on the basic mode *fear* interpreted in terms of the context it had arisen. Others do not only presuppose denotation to the basic mode and context, but also involve an agent's self-estimation. Such terms as *jealousy*, *shame*, *pride*, for example. The idea is that the meaning of each emotional term is shaped by the context in which it arose. The

context might also include agent's self-estimation, his/her evaluations his/her own actions, and actions of other agents. This idea is well-discussed,⁶ but actually the conditions of interpretation of the meanings of more complicated terms are not described. Moreover, as it has been shown by many authors, the meaning of basic terms themselves are not so simple.

According to the nature of evaluation all emotions, generally speaking, can be distinguished either as positive or as negative. The conditions of wish-frustration and wish satisfaction can be taken as a ground of such a division (Gordon 1987, p. 53). R. Gordon have been developing Searle's approach to emotions as kinds of positive and negative desire. Although this idea has been criticized (see Solomon 1994), it makes some sense. For example, in the definitions given by Wierzbicka we can see that if something has been evaluated at the beginning as *bad*, then the pattern "I don't (didn't) want this" follows further. We assume that the valency of evaluation can be reduced to the desirableness of some events or states of affair.

The second division made by Gordon is based on the difference between logical properties of the epistemic modes: to believe and to know. So called epistemic emotions express uncertainty whereas factual ones express certainty.⁷ In short his classification may be presented in the following table:

| | | |
|-----------------|------------------|----------------|
| | <i>epistemic</i> | <i>factive</i> |
| <i>positive</i> | hope | joy |
| <i>negative</i> | fear | anger |

In spite of many objections that can be made, the classification indicates main logical properties of some emotional concepts and opens the possibilities to explicate them by means of logic. Actually emotion taxonomy seems to be more sophisticated. We propose to attribute emotional concepts to next three types: *causal*,⁸ *personal* and *social* emotional concepts. The main points in distinguishing the types of concepts are:

- referring to agent's "Self";
- evaluation of physical events or someone's actions;
- evaluation of agent's own actions or actions of others;
- adopting the action as being intentional or non-intentional;
- prescribing the act in return;

The positive-negative opposition is adopted within each type:

(1) *Causal emotional concepts.*

They do not contain any special system of expectations and do not refer to agent's "Self". In principle, we can adopt that pleasant events are always desirable, anyway their desirableness might be ascribed to them *post factum*.

positive: Joy, glad, pleased;

negative: sorry.

(2) *Personal emotional concepts.*

The meanings of these terms include the evaluation of some events as being good or bad for the agent him/herself. At the same time the event has not been seen as result of someone's intentional actions.

positive: hope, excite, contented

negative: fear, sorrow, sad.⁹

(3) *Social emotional concepts.*

The meanings of these terms presuppose having some ideas about social commitments. Agent evaluates his/her own actions and actions of other agents taking social normativity into account. In language this aspect has been expressed usually by wanting others to know (or not) about agent's actions.¹⁰ Moreover, there can be direct prescriptions to act in return or to avoid any acting in the structure of some emotions. For example, *anger* prescribes to act aggressively in return.

positive: pride, triumph;

negative: anger, remorse, guilt, shame, jealousy

The next important feature of this type of emotions indicates their connection with intentional actions. For example, according to Wierzbicka, the meanings of *remorse* and *guilt* differ from each other at this point. *Remorse* presupposes intentional action whereas *guilt* is connected rather with side effects of an action. Compare:

Remorse

(...)

I did something bad

I knew: this is bad

I can't not think: this was bad

I would want: I didn't do this

(Wierzbicka 1992a, p. 572-73).

Guilt

(...)

I did something

because of this something bad happened

because of this I can't think

something bad about me

Of course, we do not pretend to regard proposed typology of emotional concepts as complete. It cannot be complete, because the set of emotional terms is wide and variable enough for every natural languages. We have taken just the most often used concepts. This typology has been thought as an instrumental one, its goal is to sort out emotional concepts according to such features that make the possibilities of their representations in logical languages more visible.

5. *Emotional and cognitive modes*

Our purpose is to make preliminary informal schemes of some emotional concepts. We will use the language of predicate operators (Ishmuratov 1987) that allows us to represent the structure of emotional concepts in terms of other cognitive (intentional) states.¹¹ The predicate operator is a function having a term or a formula as its argument. This allows us to express reasoning with iterations.

Let us suppose that any intentional state can be represented as $\text{MODE}(x, A)$, where MODE means some intentional mode, x is name of agent, and A is a propositional contents that can be specify with other predicate operators. For example, there can be built such an expression in this language as:

$$\text{MODE}(x, \text{MODE}(x, y, (\text{MODE}(y, A))))).$$

Now let us specify logical properties of epistemic and volition modes needed for representing emotional ones. Any ordinary language has wide range of possibilities to express these modes. We can regard *desire*, *want* and *intend* as elementary predicates of volition. First two are the most abstract modes so far as they do not require making any consistent choices of their objects. They can be contradictory and unconscious. The verb "to want" can develop the meaning "to intend". Desire is the most important motive to choose but it does not determine the choice necessarily. Everything what we can say about logical properties of *want* is:

$$\text{WANT}(x, A) \Rightarrow \text{BEL}(x, \neg A)$$

if there is the case that x wants A it means that x have not in the moment.

Intend has the same property. Moreover intention is a result of making decision that is why intention is always conscious and consistent.

Decide means the transition from one state of world to another one, the conjunction of two or more consistent states of affair. When the focus of communicative interest has been displaced to next state, the meaning of *decide* becomes equivalent to the meaning of *intend*. That allows us to regard the process of making decision as a process of forming intention.

$$\text{DECIDE}(x,A) \Rightarrow \text{INTEND}(x, \text{DO}(x,A))$$

where $\text{DO}(x,A)$ is a predicate operator of action.

$$\text{INTEND}(x, \text{DO}(x,A)) \Rightarrow \text{DO}(x,A).$$

Next important feature of violating predicates is their connection to belief. Alternatives proposed by violation are controlled propositions. "(...) I can intend to make such actions that I know that I can perform them, I consider myself being able to make them." (Shatunovski 1988, p. 170).

The main epistemic modes are *believe* and *know*. *Know* and *believe* are taken in traditional sense. The peculiarity of *believe* consists of that fact that its true value might be independent on the true value of its contents. *Know* is considered as a specification of *believe*.

$$\text{KNOW}(x,A) \Rightarrow \text{BEL}(x,A) \ \& \ A$$

This predicate will be used in our scheme to identify the actions (events) that have already done (happened) in order to avoid the introduction of temporal operators. According to features of their logical features made above we can represent some emotional concepts in such a way.

According to R.Gordon's classification, causal emotional concepts are always factive emotions. The cognitive appraisal they contain has been shaped by ascribing of desirableness or non-desirableness to the current state of affairs.

$$\text{JOY}(x,A) \rightarrow \text{WANT}(x,A) \ \& \ \text{KNOW}(x,A)$$

$$\text{SORRY}(x,A) \rightarrow \text{WANT}(x, \sim A) \ \& \ \text{KNOW}(x,A)$$

Personal emotional concepts can be factual as well as epistemic. The structure of some of them can contain the prescription to act in return. For example,

$$\text{SPITE}(x,A) \rightarrow (\text{WANT}(x,-A) \ \& \ \text{KNOW}(x,A)) \rightarrow \\ \rightarrow \text{INTEND}(x,\text{DO}(x,B)).$$

Social emotional concepts have the most complicated structure. Thus, the concept of *guilty* has to do with agent's non-intentional action, rather its side effects:

$$\text{GUILT}(x,A) \rightarrow \text{WANT}(x,A) \ \& \ \text{BEL}(x, \neg(\text{DO}(x,A) \rightarrow \text{DO}(x,B))) \rightarrow \\ \rightarrow \text{KNOW}(x,\text{DO}(x,B) \ \& \ \text{WANT}(x, \neg\text{DO}(x,A))).$$

The concept of *remorse* is connected with agent's intentional action:

$$\text{REMORSE}(x,A) \rightarrow (\text{INTEND}(x,\text{DO}(x,A)) \ \& \ \text{KNOW}(x,\text{DO}(x,A))) \rightarrow \\ \rightarrow \text{WANT}(x, \neg\text{DO}(x,A)).$$

In the case concerning the action of other agents or in the case where the opinion of others taken into account the schemes have to be specified by introducing parameters of agents' names.

These concepts do not presuppose to act in return:

$$\text{HURT}(x,y,A) \rightarrow \text{BEL}(x, \neg\text{WANT}(y, \text{DO}(y,x,A))) \ \& \\ \ \& \ \text{KNOW}(x,\text{DO}(y,x,A)).$$

$$\text{SHAME}(x,y,A) \rightarrow (\text{WANT}(x, \neg\text{DO}(x,A)) \ \& \ \text{KNOW}(x,\text{DO}(x,A))) \rightarrow \\ \rightarrow \text{WANT}(x, \neg\text{KNOW}(y,\text{DO}(x,A))).$$

The structures of *proud* and *envy* are very similar. They differ in the respect that *proud* contains only evaluation of agent's own action whereas *envy* presuppose that the same result has been reached by other agent.

$$\text{PROUD}(x,y,A) \rightarrow (\text{INTEND}(x,\text{DO}(x,A)) \ \& \ \text{KNOW}(x,A)) \rightarrow \\ \rightarrow \text{WANT}(x,\text{KNOW}(y,(\text{DO}(x,A)))).$$

$$\text{ENVY}(x,y,A) \rightarrow \text{INTEND}(x,\text{DO}(x,A)) \ \& \\ \ \& \ \text{KNOW}(x,((\neg\text{DO}(x,A)) \ \& \ \text{DO}(y,A))).$$

The structure of *anger* represents agent's belief about mutual intention, the breach of it and prescription to act in return.

$$\text{ANGER}(x,y,A) \rightarrow \text{BEL}(x,\text{BEL}(y,(\text{INTEND}(y,x \ \text{DO}(y,x,A)) \ \& \\ \ \& \ \text{NOW}(x,\text{DO}(y \neg A)) \rightarrow \text{INTEND}(x,\text{DO}(x,y,B)).$$

6. Summary

Emotions usually have been discounted and eliminated in a serious philosophical discourse. Emotional terms are used simply in order to indicate the domains that are beyond of an explanation in the terms of these theories. That is why they are called irrational. Nevertheless, people successfully express emotion that guides and foretells everyday behavior. Each of us can grasp the implicit meanings of emotional words. The problem is to explicate these meanings.

There are many ways to approach the topic of the rationality of emotions. Our suggestion is that emotions themselves provide specific mode of rationality: they involve the evaluation of a certain event or state of affairs according to agent's "internal" standards of rationality. These standards can be represented as a set of beliefs and desires structured in a certain way (scenario). The task of logic in this domain could be consisted in working out the languages of such representations. We assume that approach proposed will inspire specialists from different areas to pay their attention on the methodological value and explanatory power of emotions.

Acknowledgment

I am very grateful to Prof. William Gleason and Mrs. Ludmila Castroll for their help in checking the English of the paper.

Notes

- 1 R. de Sousa introduces similar ides of paradigm scenario (de Sousa 1990, pp. 181-84).
- 2 J. Searle also uses implication (not equivalence) in his preliminary schemes of emotional states (Searle 1983, p. 31).
- 3 Contrary to belief, desire, and the states that have often been regarded as emotional ones: for example, anxiety that can be labeled as mood, or such long-termed "emotional attitudes" as love, hate, etc.
- 4 See (Wierzbicka 1992a,b) for more details.
- 5 Compare the ways of representing semantics meaning of *sorry* proposed by Searle and Wierzbicka. We can see that both authors mentioned its simplicity. The main patterns in its structure are:
 "(...)
 something bad happened to someone
 I would want: this didn't happen..."
 (Wierzbicka 1992a, p. 562).
 According to (Searle 1983, p. 32): SORRY (p) - BEL(p) & DES(-p).
- 6 See (Ortony, Clore, Collins 1988), (Wierzbicka 1992a,b).

- 7 Gordon's definitions of the states of wish-frustration, wish-satisfaction, and Knowledge and belief Conditions can be found in (Gordon 1987, pp. 36-37, 52-53).
- 8 We adopted Oatley and Johnson-Laird's name "*causal terms*" as catching the sense of these concepts the most precisely.
- 9 *Hope* and *fear* are worth to pay special attention as two fundamental modes of expectation. They cannot be attributed to the type of causal emotional concepts because their meaning presuppose the evaluation of some possible states of affairs with regards to agent's "Self".
- 10 Compare the meaning structures of *pride* and *shame* according to (Wierzbicka 1992a, pp. 574, 576).
- "*Ashamed*
(...)
everybody can know something bad about me
because of this, everybody can think something bad about me
I don't want this
because of this, I would want to do something
I don't know what I can do
I would want: no-one will know about this
because of this, this person feels something like this
X feels like this."
"*Pride*
(...)
everybody can know something good about me
because of this, everybody has to think something good about me
I can think something good about me
I want this:
because of this, this person feels something good
X feels like this."
- 11 According to (Searle 1983, p. 15) requirement to characterize intentional states in intentional terms.

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