

## RESPONSE TO COMMENTARIES ON "ON THE NATURE OF EMOTION"

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Candland's comments are rewarding and reinforcing. I accept his comment on Plutchik; I used "alarm reaction," perhaps improperly, for a behaviour and not for Selye's physio-behavioural stress syndrome; and I did not elaborate on Ekman's work because it does not address the questions of causation, function and origin.

Scott's general comments are also encouraging. In response to particular comments, TASS theory agrees that adaptive behaviour is indeed an alternative to signalling of thwarting because it means there is no thwarting. It is the increased orientation behaviour in thwarting situations that gives rise to adaptive behaviour. TASS also agrees that uninhibited attack is neither emotional nor a signal because it is not thwarted behaviour. It becomes emotional in the form of threat signals when it is thwarted or fails. TASS theory is not inconsistent with Scott's three-factor theory of maladaptive behaviour, but he includes emotion in his motivation factor whereas in TASS theory emotion is the behavioural outcome of blocked motivations.

Scott associates an emotion with each of his behavioural classes but TASS theory says that in principle there are no categories of emotion because the orientation behaviour depends on the motivation and the spatial relation to the stimulus object. The limited possibilities of these factors can account for the commonly recognised general categories of emotion. The specific motivation and its incipient consummatory acts given the nuance and flavour of the emotion as in love of food, child, sex partner, etc.

The Lewises are unwilling to consider any redefinition of common language terms (which Scott agrees is necessary) and they regard 'what people have meant by "emotion" over the history of thought on the subject' as empirical evidence but not the animal and human behaviour that I have used to construct TASS theory. Simple arithmetic is used to imply that I have missed recent theories and findings that invalidate or supersede TASS theory but none is specified.

The Lewises' difficulties arise from their traditionalist view of emotion

as an experience or feeling state that may be expressed in behaviour while TASS theory takes the converse (neo-Jamesian) position. Feeling state classifications and concepts can be translated into TASS theory as follows. The feelings of the orientation behaviour in thwarting are those of rising tension and effort (muscular and visceral) and may be judged unpleasant according to intensity and duration. At end-of-thwarting the feelings of the relaxation of these actions and tensions may be judged as pleasant. Thus positive emotion (pleasure of end-of-thwarting) requires the prior existence of negative emotional (unpleasant thwarted) states and *not* the *avoidance* of negative states as the Lewises seem to think. Hence the practice of teasing to enhance joy and why the old joke about head-banging is no joke to the masochist.

But responses to thwarting also include incipient consummatory acts and these add specific motivation and consummatory feelings which are judged as pleasant or unpleasant (or positive and negative) according to their appetitive or aversive nature. Love, for example, is thwarted approach for consummation and should be experienced as a complex of feelings of incipient consummatory pleasure and frustrated arousal and tension. Anticipation of success (end-of-thwarting) gives joy, and of failure (chronic thwarting) gives sadness. Hence being in love can be a mixture of joy and sadness according to the changing perceptions of love returned and love unrequited.

I have great respect for the Lewises' experimental work and am delighted that the results they describe, rather than invalidating, are fully in accordance with TASS theory. Once the infant makes intentional orientation movements to produce the stimulus, there is an aroused action state that is thwarted until the stimulus appears. At first the moment of presentation is not precisely expected and so produces the surprise orientation response. Presentation of the stimulus at the expected moment gives end-of-thwarting relaxation (joy) responses. Practice leads to anticipation of relaxation, producing the joy of mastery. End-of-thwarting joy will not occur if the orientation behaviour (arm-pull) does not produce the stimulus. Furthermore, in extinction there is, as TASS theory predicts, an increase in orientation behaviour (primary response to thwarting), angry behaviour (secondary response to thwarting), and finally sadness (fatigue of primary response to thwarting). Restoration of stimulus control by the orientation behaviour (arm-pull) means that end-of-thwarting joy will reappear. The Lewises' experiment provides a beautiful confirmation of TASS theory's predictions and I thank them for it.

Simonov's "Need-informational theory" of emotion uses psychological concepts such as "personal, social, and spiritual needs" and "information and expectations." I hesitate to interpret these accurately and faithfully into the lower level biological concepts of physiology and ethology that are used in TASS theory. I think the theories agree in postulating cau-

sation of negative and positive emotions by the respective prevention and expectation of performance of aroused motivational actions. In both theories emotion is *not* a form of motivation but is a *consequence* of motivations, and the other commentators misquote TASS theory on this point. But TASS theory does also explain the apparent motivating action of emotion through its signalling effect on the behaviour of the social partner and, through self-perception, on self-conduct. Both theories also employ contact and remote stimulus relationships to differentiate categories of emotion, but with somewhat different results.

Simonov's theory does not provide a function for emotion. Social signalling of thwarting with its function of eliciting behaviour that changes the thwarting situation is a crucial element in TASS theory. Furthermore, the theories classify motivations differently. Simonov's theory uses the psychological constructs of individual, social, and mental needs, whereas TASS uses the physiological constructs of internal and sensory homeostatic imbalances and gonadal hormone levels. The theories are, to some extent, complementary, one giving a biological basis for the other. Perhaps the two together might be more acceptable to the Lewises in view of their comment on theories of light.

Finally, there is no space to consider the comments on the neurology of emotion. Simonov's treatment has similarities to that of TASS theory, which implies that, apart from ritualized displays, there will be no specific systems for specific emotions but rather an interaction of systems for specific motivations and their consummatory acts, for general approach/aversive orientation, for behavioural inhibition, and for memory and learning. I have an extensive account in manuscript form which is seeking an understanding journal editor and referees.