



## The human affectome: Cognitive, developmental, and atypicality considerations

Deanna M. Barch

Departments of Psychological & Brain Sciences, Psychiatry, and Radiology, Washington University in St. Louis, Box 1125, One Brookings Drive, St. Louis, MO 63130, USA

### ARTICLE INFO

#### Keywords

Affect  
Cognition  
Development  
Atypical

The article titled the *Human Affectome* is a marvel of integration and clarity that provides a useful organizing framework for understand a host of concepts, constructs, theories, and models of what constitute affective phenomena. Likewise, the framework addresses the assumptions that are made in models and theories of affective phenomena, definitions of various aspects of affective phenomena, and the ways in which different models or frameworks for understanding and describing affective phenomena make contact with the contained definitions. The framework is organized around a central teleological principle, “*that the collection of human affective phenomena in their entirety can only be accounted for by the nested and intertwined purposes: to ensure viability, to execute operations, to enact relevance, and to entertain abstraction* [page XX,(Schiller, in press)].” This organizational approach provides a solid grounding for what they ask researchers to do going forward, namely to conceptualize new theories, or reconceptualize existing ones, in terms of this “teleologically-principled” set of algorithms that seeks to understand affective phenomena in the context of their functionality. This ambitious project clearly deserves accolades, but there are three points where I suggest that further consideration is warranted.

The first is in the distinction, or lack thereof, between affect and cognition (Adolphs and Damasio, 2012; Forgas, 2008; Zajonc et al., 1982). Cognition has been defined as “*all forms of knowing and awareness, such as perceiving, conceiving, remembering, reasoning, judging, imagining, and problem-solving* (APA, 2018).” The components of this definition include processes that can also be understood in the context of helping an organism ensure viability. The authors allude to this challenge, but do not tackle the thorny issue of whether their teleological principle, meant to describe affective phenomena, can also essentially apply to any thought, language, cognitive, or sensorimotor process in which humans or other species can engage. Schiller et al. cite numerous works that take various perspectives on the relationship between affect and cognition.

Yet it seems as if a key issue is whether the implications of their teleological framework differ depending on the stance that one takes regarding the relationship between affect and cognition. The authors might argue that it makes no difference – the same arguments apply and can be used to organize differing theoretical frameworks and computational accounts, and one simply needs to expand the scope of phenomena to include those more typically construed as cognitive in nature (e.g., language, memory, attention). Alternatively, one could argue that such a teleologically guided approach to understanding affective phenomena becomes less useful if: a) it applies equally well to phenomena described as cognitive as to those described as affective; and b) there is strong reason to believe that there are meaningful conceptual and empirical distinctions to be made between affective and cognitive phenomena. I urge the investigators involved in the Human Affectome to articulate their stance on these issues. Further, I strongly believe that two further considerations will inform this debate and the principled study of human affective phenomena.

The first consideration is the value of incorporating a developmental perspective into the study of human affective phenomena (Bell et al., 2019). The evaluation of human affect in its “adult” form is important in and of itself, but how things operate in their fully established form is not always the same as how they operate when evolving. At least some aspects of the teleological principle outlined by Schiller et al. clearly apply across the lifespan, both to very young infants and to the oldest of adults. For example, there is face validity in thinking about forms of newborn behavior that we would be likely to call “affective” in terms of their ability to “ensure viability” of the newborn, including obvious things such as crying and smiling as ways to elicit caretaker behaviors that allow an infant to survive. However, where things may be more challenging relate to potential assumptions about the mental representations that maybe involved/required in the teleological framing of affective

<https://doi.org/10.1016/j.neubiorev.2024.105600>

Received 15 January 2024; Received in revised form 11 February 2024; Accepted 19 February 2024

Available online 21 February 2024

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behavior, and whether those are possible early in life or whether they involve the same types of representations across the lifespan. For example, the idea that one purpose of affective phenomena is to “entertain abstraction” is more challenging when considering the minds and brains of newborns and very young children. I do not think this potential challenge means that such a teleological framing is wrong (i.e., there is a difference between “must entail” versus “can entail”...) but for any theory of affective phenomena to be complete, it must be able to address any challenges or deviations that developmental variation creates and thus this is a key future direction for work on the Human Affectome.

Relatedly, the investigation of atypicality will also shed light on both teleological principles of affective phenomena and their relationship to cognition. By atypicality I mean variation in the nature of affective phenomena, their intensity/duration, or in their relationship to the putative purposes entailed by the teleological perspective. Schiller et al. allude to the relevance of atypicality when they talk about individuals with psychopathology and the computational psychiatry perspective. Atypicality may be particularly informative in considering both the purpose of affective phenomena and connections to other types of mental events. For example, are individuals who may not be able to generate representations that span long time periods, such as those with medial temporal damage, not able to experience feelings of psychological well-being? Are feelings of well-being in such individuals based on a very different timescale of evaluation, but function in a similar way? Or do feelings of well-being in such individuals have a qualitatively different nature than those in individuals who can represent or integrate over long timescales? What are the implications of breakdowns between

objective evaluations of potential threats and subjective evaluations of potential threats, such as those that occur in anxiety disorders? Does explaining such phenomena require recourse to additional constructs outside the teleological framework? How should we think about the forms or intensity of affective phenomena that seem to work against an organism’s viability, such as individuals with clinically impairing depression who experience a level of sadness that leads to suicidality or individuals with mania seeking a level of exhilaration that leads to an increased likelihood of death? Like developmental considerations, for a theory of affective phenomena to be complete, it must address any challenges that atypicality generates. I urge researchers and theorists interested in teleological frameworks, such as that admirably articulated by Schiller et al., to work towards addressing these challenges.

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