The rise of *affectivism*

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Standfirst:

Research over the past decades has demonstrated the explanatory power of emotions, feelings, motivations, moods, and other affective processes when trying to understand and predict how we think and behave. In this consensus article, we ask: Has the increasingly recognized impact of affective phenomena ushered in a new era, the era of *affectivism*?

The behavioural and cognitive sciences have faced perennial challenges of incorporating emotions, feelings, motivations, moods, and other affective processes into models of human behaviour and the human mind. Such processes have long been marginalised or ignored, typically on the basis that they were irrational, unmeasurable, or simply unenlightening. However, it has become increasingly difficult to deny that these processes are not only linked to our well-being, but also that they shape our behaviour and drive key cognitive mechanisms such as attention, learning, memory, and decision-making.

Fertile ground for addressing these challenges lies in the writings of the ancient Greeks, and of eminent scholars such as Descartes, Hume, Darwin, Wundt and James, to name but a few. The most recent seeds were sown in the 1960s, allowing an unprecedented, multidisciplinary interest in affective processes to take root around twenty years later. Research on such processes has positively blossomed since, as growing numbers of dedicated researchers, departments, research centres, journals and societies contribute to the affective sciences – a highly integrative endeavour that spans disciplines, methods, and theories.[1-4] By reaping the fruits of these cumulative advances, we are now able to understand and account for more of the variability in the available data and formulate more powerful and precise predictions as a consequence. Indeed, so profound have the repercussions for our shared models of human behaviour become that we can now ask whether we have moved beyond the eras of behaviourism and cognitivism, into the era of *affectivism*.

Characterizing *affectivism*

One of the leaders of the "cognitive (r)evolution" described how "behavio[u]rism faded because of its failure to solve basic questions about human thought and action".[5] Indeed, although elements of behaviourism continued to influence cognitivist thinking, cognitivism represented a rejection of some of the central tenets of behaviourism. But the affective sciences supplement cognitivism rather than supplant it. In fact, if cognitivism is conceived

of as an approach in which the inclusion of cognitive processes in models of behaviour, mind and brain increases the power to explain not only cognitive phenomena but also behaviour, then *affectivism* would be the approach in which the inclusion of affective processes in such models not only explains affective phenomena but, critically, further enhances the power to explain cognition and behaviour (Figure 1a).

The definition of affective processes, either as a whole or individually, is subject to debate. For example, questions continue concerning how definitions of emotion should accommodate the fact that we continuously evaluate events around us and the way in which our central and peripheral nervous systems allow the emergence of expressions, physiological arousal and bodily reactions, action tendencies and felt subjective experiences. Nonetheless, it seems that affective processes are typically understood to relate to the notion of (dis)pleasure or valence, to not necessarily be consciously felt, and to mobilize the organism to deal with events that may be important to that organism. In any case, scientific study is beset by questions of terminology: Persistent difficulties in formally defining 'cognition'[6] did not prevent the transition from behaviourism to cognitivism, and the fact that there is no consensus concerning a formal definition of other important constructs such as intelligence, religion, culture and even life does not preclude fruitful scientific study of them.

Indeed, in spite of these questions of definition of some of its core phenomena, the affective sciences have already led to a better understanding of how we acquire knowledge of the objects, concepts and people around us, and how we determine the value of those things. Importantly, emotions do not just shape how we interpret the world, but also shape which aspects of the world need our attention and which can safely be ignored: Emotions are not just about what *is*, but also about what *matters.*

Developing affective sciences

The recent and transformative influence of the affective sciences on scholarly discourse about human mind and behaviour is apparent in the evolution of funding (Figure 1b) and publications (Figure 1c), even in areas related to central cognitive mechanisms - e.g., memory, attention, perception, and decision-making (Figures 1d-1g). Particularly in psychology since the 1980s, the tight relationship between affect, cognition and behaviour has been revealed in ongoing research topics such as emotional intelligence, emotion regulation, addiction, decision making and social interaction. But several other disciplines also began paying increasing attention to affective phenomena around the same time, and the burgeoning interest continues.

One key example is *affective neuroscience.* While the term itself emerged only in the 1990s, previous ground-breaking studies of the emotional brain, in particular of the amygdala and its role in emotional learning, had set the stage for this field to emerge.[7] Studies began to reveal the brain circuitry responsible for many affective phenomena in animals and humans, including threat detection and anxiety reactions, homeostatic feelings and motivations, sexual and affiliative reactions, reward wanting and liking, and addictions. Innovative studies with brain-damaged patients highlighted the interdependence of cognitive and affective processes, the distinction between emotions and feelings, and the essential role of emotions in the decision-making process. Neuroscientific advances also played a key role in popularising emotion research for the public at large, as the first functional magnetic resonance imaging pictures in the 1990s seemed to cement the status of human emotion as an objective, measurable, and scientifically accessible phenomenon. In terms of the origins of our affective lives, studies of young children began and continue to highlight the critical role of emotion and motivation in human development,[8] and advances in *comparative affective science* are providing new insights into the evolutionary and ethological bases of affective processes in humans and non-human animals.[9]

In the clinical domain, long-established classification models of mental health and illness based largely on lists of behavioural manifestations and cognitive disturbances have recently been challenged by a new diagnostic system, proposed by the NIMH, which relies heavily on emotion-related constructs, including arousal, and positive and negative valence systems.[10] Similarly, neuropsychological assessment, intervention and rehabilitation after brain damage or disease have traditionally focused on cognitive functions (e.g., language, perception, and memory), but have in recent years begun to take affective domains more seriously, as has the psychotherapeutic treatment of many mental health problems. These advances represent key shifts in fundamental conceptions of mental well-being, illustrating how research on affective processes benefits from and influences advances elsewhere.

A similar illustration can be found in *affective computing*. Since its launch in the 1990s,[11] the development of artificial intelligence and social robotics has led to specific computational approaches aimed at implementing emotional processes in artificial agents (socially interactive agents, social robotics, chatbots) and systems. This trend is particularly apparent in signal processing research that allows more sensitive measuring and monitoring of affective responses. Affective computing has powerful implications for industry, social media and education, and, when combined with clinical research, also for health monitoring and patient care.

There are also key roles for the humanities and the social sciences in the affective sciences. In recent decades, philosophy has seen emotion, affect, feelings, and related notions become central explanatory tools, alongside belief and desire, in theories of mind and in accounts of moral and evaluative thought and behaviour.[12] In the field of history, several research centres dedicated to emotions have been established in the past decade, mapping how emotions themselves have been conceptualised and expressed differently over time and

across cultures, and highlighting the influence of emotions as determinants of historical action and thought.[13]

Researchers have also begun to pay more attention to affective processes in general linguistics, analysing, for example, how emotions are referred to in the languages of the world via the diverse emotion lexica.[14] In terms of cultural comparisons, there are emotion words that do not seem to have equivalent words in English, such as *amae*, a Japanese emotion word which means something like desiring to be loved by or dependent on someone. In linguistic pragmatics, theories of utterance interpretation now explore not only the expressive qualities of figurative language (metaphor in particular), but also the direct manifestation of emotions through linguistic and paralinguistic means, effectively embracing the very same affective dimension that was formerly disregarded.

Meanwhile, in the social sciences, behavioural economists have developed more psychologically realistic assumptions about economic agents - *homo economicus* - by incorporating affective processes into their theoretical and empirical models of investment behaviour, medical decision making, bargaining, and issues in political economy such as voting behaviour. Anthropology, too, has begun to focus on the cultural modelling of human affective processes, highlighting the intercultural variety of emotion repertoires, while research in sociology has complemented this approach with a focus on intra-cultural plurality and the role of emotions in social collectives.[15] Indeed, most anthropologists and sociologists now recognise the significance of emotions in human behaviour, and study emotional interactions at the micro-level (between individuals or in small groups), the meso-level (social institutions), and the macro-level (social structures such as class, age or gender). Emotions are considered fundamental social phenomena, forming the basis for many kinds of social activities and interactions, and playing an essential role in socialisation

processes, such as affective social learning. Thus, just as cognition and behaviour can serve both social and non-social functions, so too can affect.

The influence of affective sciences is also growing in socially relevant domains, shaping research and public attention accordingly (Box 1). Other key disciplines in which emotions and feelings are being taken more seriously as objects of research include the political sciences, public policy, communication, literature, and the arts.

A relevant and timely question

Scientists typically neglect what they cannot measure in order to reduce noise in their data and better attend to their object of study: Behaviourism neglected the central role of cognitive and affective processes; cognitivism neglected the role of affective processes. While the behavioural and the cognitive sciences remain essential to the study of the mind, brain and behaviour, given that emotions are often held to involve both cognitive aspects and behavioural tendencies, an era of *affectivism* can be seen as a potential natural successor to both the behaviourism and cognitivism eras: it would naturally incorporate both perspectives. In this light, perhaps the growing interest in the affective sciences stems from the maturation of the scientific study of how and why we think the way we think and do the things we do.

But the relevance of the question of whether or not we are in a new era hinges perhaps not just on an appreciation of historical scientific progress or of the contribution of the affective sciences, but also on how cognitive processes are defined: If one assumes that all mental processes – including affective processes – are captured by the word *cognitive*, then any blossoming of the affective sciences could be said to be simply part of the further growth of the cognitive sciences; as such, the question could perhaps seem irrelevant. Nevertheless, asking it would at the very least constitute a call for our colleagues to consider advances in the affective sciences in light of their own models and research: considering

affective processes in cognitive and behavioural models may well increase the explanatory and predictive power of such models. Above all, we hope this brief opinion piece might initiate and stimulate constructive, interdisciplinary, and passionate debate.

The conceptual, methodological and technical advances made within the last few decades have demonstrated that affective processes are unquestionably enlightening when it comes to understanding both behaviour and cognition. While it will ultimately be the responsibility of historians of science to determine whether or not a new era has begun, given the undeniable impact of affective sciences on our models of brain, mind, and behaviour, it seems relevant to ask today whether we are now in the era of *affectivism.*

Total = 1992 words (with “standfirst”)

References

1. Davidson, R.J., Scherer, K.R., & Goldsmith, H.H. (Eds.). *Handbook of affective sciences*. Oxford University Press. (2003).
2. Sander, D., & Scherer, K.R. (Eds.). *The Oxford companion to emotion and the affective sciences*. Oxford University Press. (2009).
3. Dalgleish, T., & Power, M.J. (Eds.). *Handbook of cognition and emotion*. John Wiley & Sons Ltd. (1999).
4. Scarantino, A. (Ed.). *The Routledge handbook of emotion theory.* Routledge. (forthcoming).
5. Mandler, G. Origins of the cognitive (r)evolution. *J. Hist. Behav. Sci.*, **38**, 4, 339-353. https://doi.org/10.1002/jhbs.10066 (2002), p. 339.
6. Bayne, T., et al. What is cognition? *Curr. Biol*, **29**(13), R608–R615. https://doi.org/10.1016/j.cub.2019.05.044 (2019).
7. Armony, J., & Vuilleumier, P. (Eds.). *The Cambridge handbook of human affective neuroscience*. Cambridge University Press. https://doi.org/10.1017/CBO9780511843716 (2013).
8. Dukes, D., Samson, A.C, & Walle, E. (Eds.). *The Oxford handbook of emotional development.* Oxford University Press. (forthcoming).
9. Kret, M.E., Massen, J., & Bliss-Moreau, E. (Eds.). Special issue: Building a truly comparative affective science. *Neuroscience and Biobehavioral Reviews.* https://www.sciencedirect.com/journal/neuroscience-and-biobehavioral-reviews/special-issue/10Q4N0GFXM7 (2021).
10. National Institute of Mental Health. Strategic plan for research. https://www.nimh.nih.gov/about/strategic-planning-reports/index.shtml (2008).
11. Calvo, R.A., D'Mello, S., Gratch, J., & Kappas, A. (Eds.). *The Oxford handbook of affective computing*. Oxford University Press. (2015).
12. Goldie, P. (Ed.). *The Oxford handbook of philosophy of emotion*. Oxford University Press. (2009).
13. Broomhall. S., Davidson, J., & Lynch, A. (Eds). *A cultural history of the emotions* (1st ed., Vol. 1-6). Bloomsbury Academic. (2019).
14. Pritzker, S.E., Fenigsen, J., & Wilce, J.M. (Eds). *The Routledge handbook of language and emotion.* Routledge. (2019).
15. Stets, J.E., & Turner, J.H. (Eds.). *Handbook of the sociology of emotions* (*Vol. 2).* Springer. (2014).

Author contributions

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Competing interests

The authors declare no competing interests.

Box

The growing influence of the affective sciences in socially relevant domains

These examples are taken from core disciplines in the social sciences (including law, education, environmental research, conflict and reconciliation research).

- Legal scholars are increasingly challenging the incomplete behavioural and cognitive assumptions inherent in legal theory and practice, carefully considering the role of affective processes in legal decision making, and acknowledging how laws and legal rules reflect and create cultural scripts of how people *ought to feel*.
- In education research, links between well-being and education are increasingly uncovered, resulting in changes in policy and the continuing rise in the number of socio-emotional learning programs.
- In research on climate change mitigation, investigators have begun to focus on the importance of affective processes for signalling the urgency of the situation and for motivating collective remedial action, both for private citizens and governmental organizations.
- In research on violent international conflict, purely ideological or rational utility-based considerations for group and political actions are now outdated – they are no longer considered within the limited scope of what is good (conciliatory) versus what is bad (aggressive) – as research now takes into account a more diverse scope of distinct emotions and possible consequent behaviours.

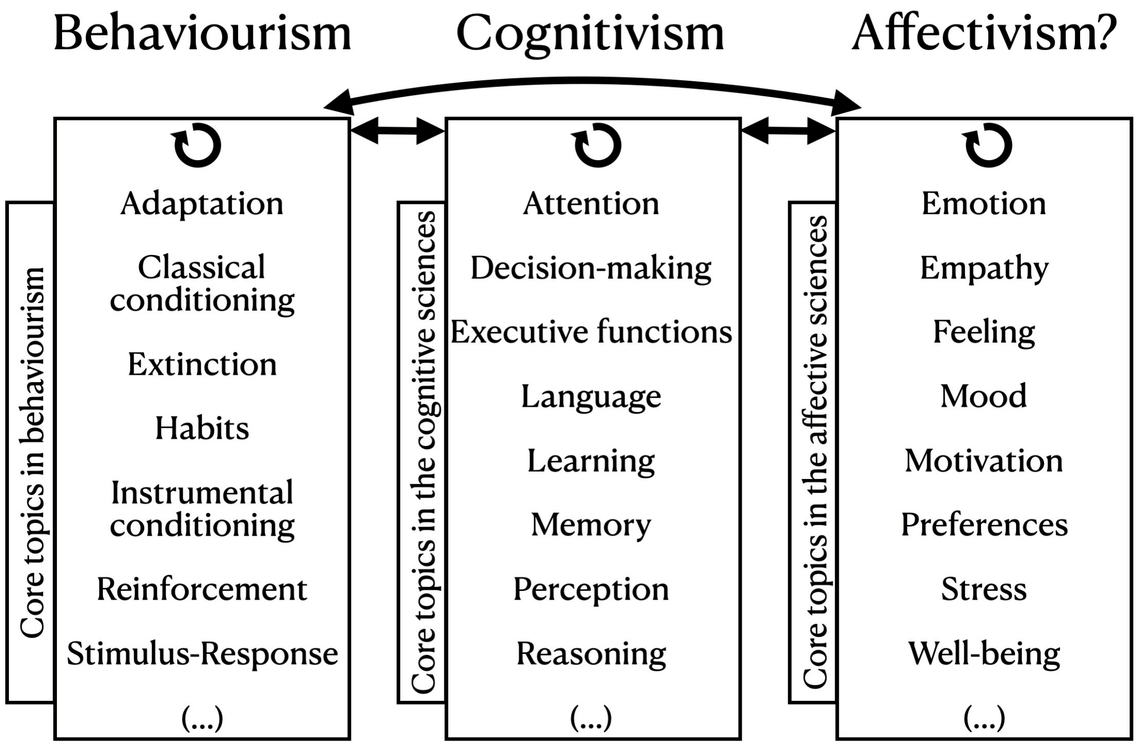
Figure Caption

Figure 1: The scope and increasing impact of the affective sciences

a, asks whether the increasing research focus on affective processes and on their explanatory power means we are now in the era of *affectivism*. The circular arrows represent how the study of the processes within each box improves our understanding of the core mechanisms typically investigated in behaviourism, and in the cognitive and affective sciences, respectively. The bidirectional arrows between the boxes represent the idea that the mechanisms described in one box are important to understand those described in the other boxes. **b,** shows the relative increase of NIMH funding spent on research on emotion since 1985. **c,** shows the extent to which publications with considerable emotion content grew faster than those concerning behaviour without emotion content since 1980. The lower panel shows the increasing prominence of publications involving emotion as a percentage of publications in the respective area of inquiry on core cognitive mechanisms such as **d,** memory, **e,** attention, **f,** perception, and **g,** decision-making.

The reference list in the main text focuses on Handbook-type publications to represent the depth and breadth of the affective sciences across many academic fields. For a list containing some books and papers that have either helped shape the field in many disciplines in the affective sciences or that have the potential to do so, please see the suggested reading list in the supplementary material section.

a


Behaviourism
Cognitivism
Affectivism?
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Classical conditioning
Extinction
Habits
Instrumental conditioning
Reinforcement
Stimulus-Response
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Core topics in the cognitive sciences
Attention
Decision-making
Executive functions
Language
Learning
Memory
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Reasoning
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Core topics in the affective sciences
Emotion
Empathy
Feeling
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Motivation
Preferences
Stress
Well-being
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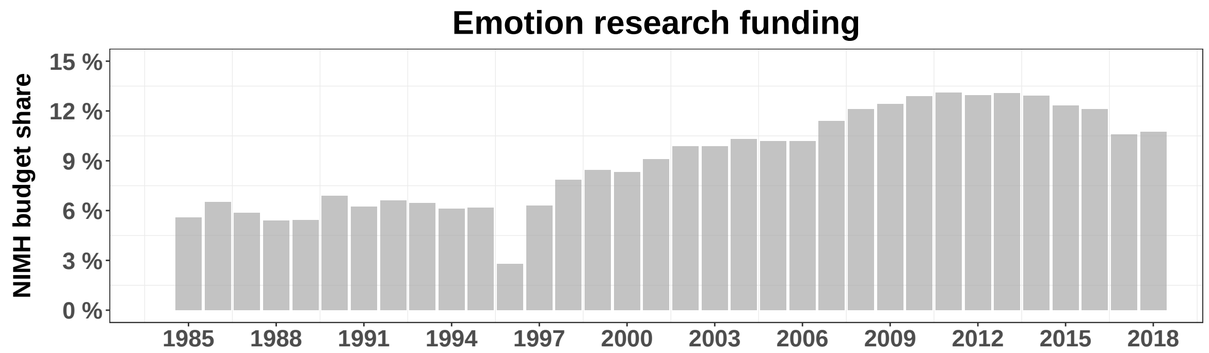
b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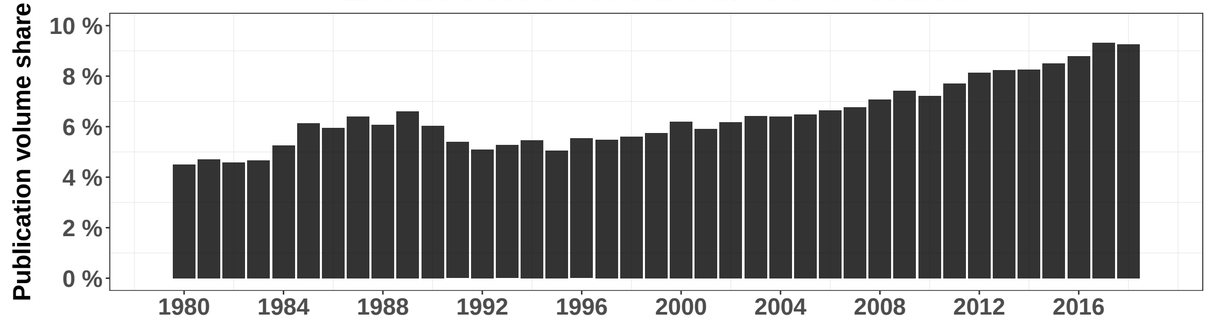
Emotion content in 'Behaviour' research
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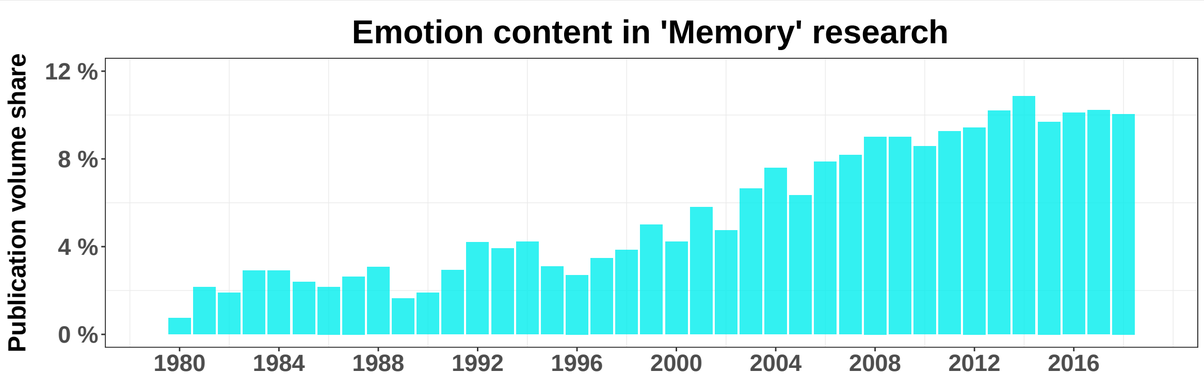
Emotion content in 'Memory' research
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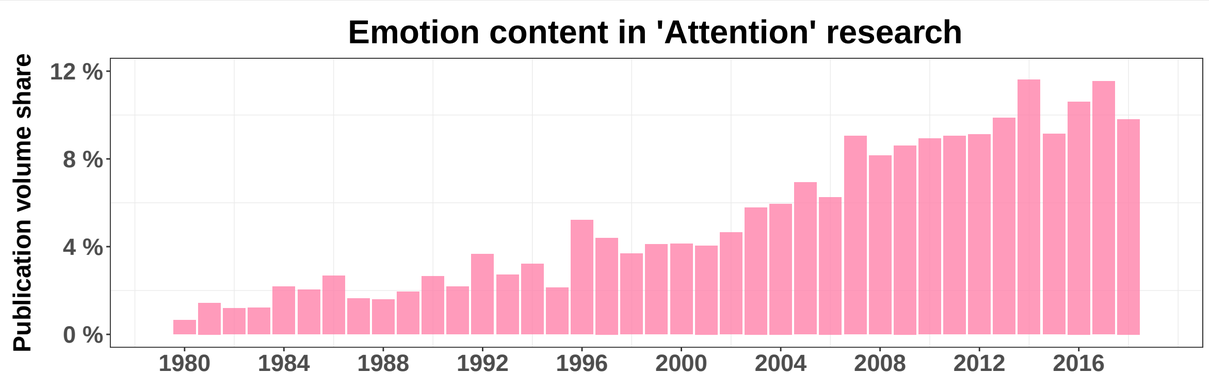
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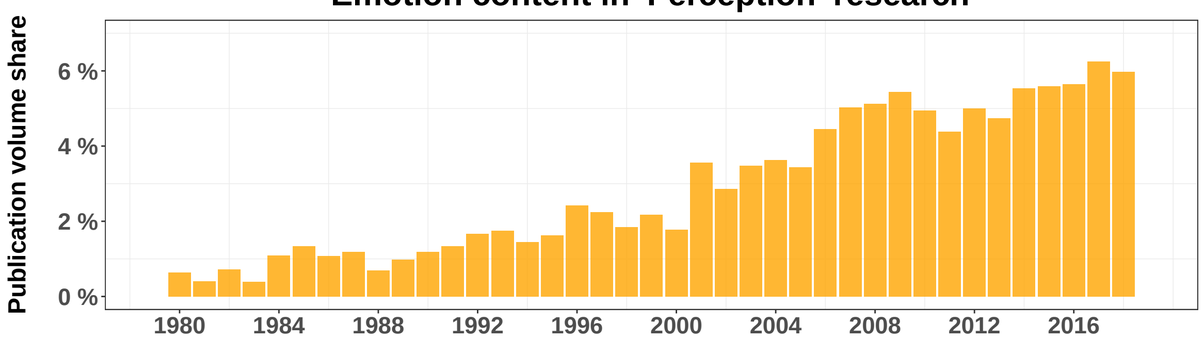
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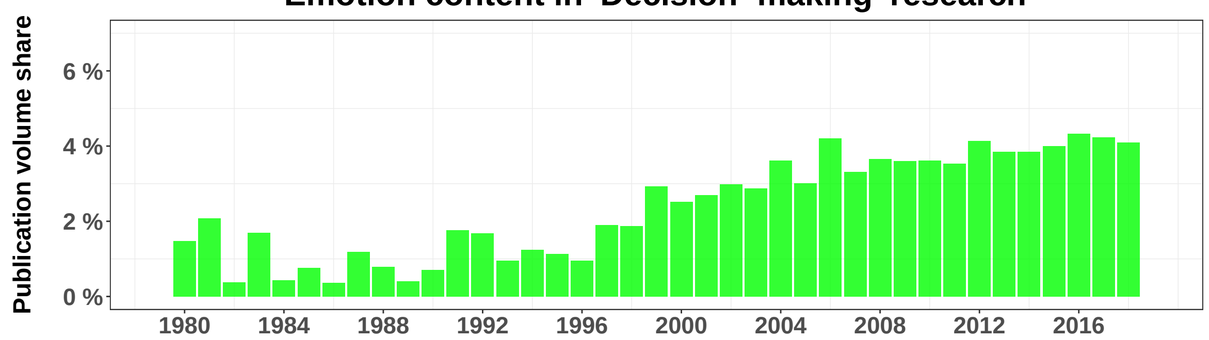
Emotion content in 'Decision−making' research
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