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Letter

Respect Defended

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When young children are asked to distribute valuable resources, they consider unequal allocations unfair and even pay a personal cost to rectify the inequality. Yet, in situations of procedural fairness, when an unequal distribution results from an impartial procedure, children deem that result fair – even if they end up being personally disadvantaged. What is going on? At first glance, we might conclude that children's sense of fairness consists of a suite of different psychological mechanisms and processes. In our recent *Trends Cogn. Sci.* paper, however, we provided a unifying framework which maintains that one and the same psychological mechanism – a desire for equal respect – underlies these various phenomena [1]. McAuliffe, Warneken, and Blake [2] doubt that the 'fairness as equal respect' view carries such explanatory power, and highlight two distinctions that, in their interpretation, our view cannot account for. We respond to these in turn.

The first distinction is between being averse to receiving less than others (disadvantageous inequity aversion, DIA) versus being averse to receiving more than others (advantageous inequity aversion, AIA). Using an innovative measure, McAuliffe and colleagues [3] have produced a convincing body of evidence that, in windfall situations, DIA emerges earlier in development than AIA (at around 3 versus 8 years of age, respectively). However, this does not license the inference that different mechanisms, instead of the unifying mechanism we propose, underlie children's sense of fairness. In distributive situations, children's selfish motives – for example, to maximize their rewards relative to their partner [4] – interact with their sense of fairness in complex ways. In contexts where children are disadvantaged relative to their partner (DIA), fairness and selfish motives are aligned: both are expressed in a desire for more resources. In contexts where children are advantaged relative to their partner, on the other hand, fairness and selfish motives pull in opposite directions. This, not a different sense of fairness, explains the delayed developmental emergence of AIA. Indeed, when the fairness motive is strengthened through the collaborative production of rewards, the developmental delay of AIA relative to DIA is erased: both forms of inequity aversion are in place by age 3 [5,6]. Further, when selfish motives are not at work at all – because children distribute resource between third parties – children at this age also distribute equally [7]. Importantly, the fairness as equal respect view can also explain unequal distributions, such as when a child who has worked harder during a collaborative effort receives more resources. In such situations children 'respect' the fact that their partner has worked harder than them, and thus deserves a larger share. Even this notion of deservingness, however, can only be understood conceptually against a background norm of partner equality: equal resources are allocated for equal units of work contribution.

The second distinction is between distributive and procedural fairness. The fairness as equal respect view questions the widespread intuition that children's responses to unequal distributions are grounded in material concerns, and suggests instead that they are based on interpersonal concerns: children seek equal respect. A main line of support for this view comes from the observation that children accept unequal distributions if the procedure gave everyone an equal chance, that is, respected everyone as equals [8,9]. By contrast, McAuliffe and colleagues maintain that 'outcomes matter' and that children react negatively to unequal distributions even when such distributions do not imply disrespect. Their first argument is that children refuse unequal distributions even when they are not paired with a partner. However, this situation does not speak to fairness at all because fairness necessarily involves social comparison. What is more likely to be going on in these contexts is that children are disappointed with how they are being treated by the experimenter relative to how she could have treated them (a behavior that is also shown by chimpanzees [10]). In addition, McAuliffe and colleagues rightly point out that the fairness as equal respect view predicts that children should accept unequal offers in the ultimatum game if the proposer had no control over the offer since, in such contexts, unequal distributions do not convey disrespect. Their claim that it is not supported rests on a study of children in anonymous and complex settings [11]. However, the prediction is supported if children are tested in a paradigm that involves face-to-face

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interaction, an age-appropriate methodology, and a straightforward payoff structure [12].

In addition to these considerations, we want to clarify that our view does not imply that outcomes do not matter. On the contrary, material rewards are one of the main ways by which children (and adults) measure whether they are being respected or not. It is only, or so we would argue, that children's reactions to distributions are ultimately not about the material rewards themselves, but about what they express: (dis)respect.

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Forum

At the Heart of Cognitive Functioning in Aging

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Several neural and non-neural factors contribute to individual differences in cognitive performance. Here we outline a sequence of vascular events where excessive transfer of arterial-pressure pulsatility damages hippocampal capillaries. We argue that the vascular alterations decrease the ability to sustain neural activity and thereby contribute to episodic-memory impairment in aging.

Brain maintenance (i.e., relative lack of age-related pathology) is a primary determinant of successful memory aging [1]. For episodic memory, preservation of the hippocampus is vital and is likely to depend on the maintenance of both neural and non-neural factors [1,2]. Within the broad class of non-neural factors, it has been suggested that a complex chain of cerebral vascular pathological changes contributes to cognitive decline in normal and pathological aging [2]. Here, partly based on findings from studies using state-of-the-art MRI methods (Box 1), we outline an integrative model (Figure 1) in which age-related vascular changes at the arterial and cerebral levels influence hippocampal functioning and episodic memory. (Additional references can be found in the supplemental information online.)

At the arterial level, a negative association between pulse pressure and cognition has been recognized for decades. Arterial pulsatility is generated by cyclic cardiac contractions pumping blood through the arterial system. The elasticity of the aorta and large arteries absorbs much of the pulsatility and ensures a smooth blood supply at the level of the microcirculation (the Windkessel effect). The link between aortic elasticity and pulsatility in carotid arteries has been demonstrated in mice [3]. In aging, the aorta and large arteries become stiffer and less compliant, which translates into increased pulsatility in carotid arteries that feed the brain [4].

Our model highlights that excessive capillary pulsatility can induce detrimental structural changes at the cerebral level. In a large, community-based human sample, individual differences in pulsatility in carotid arteries were found to be related to brain integrity and memory performance [4]. Although some degree of pulsatility is essential for vascular health, the observed association highlights the negative consequences of surpassing optimal ranges of pulsatility. Concerning regional specificity, there is evidence that the structural integrity of the hippocampus is especially sensitive to pulsatile stress. Such sensitivity could be attributed to regional differences in the branching patterns and vessel length of the cerebrovascular bed that lies in between the carotid arteries and capillaries, causing increased pulsatility to be especially marked in arteries that feed the hippocampus. In a comprehensive MRI study, measurements of pulsatility of flow in cerebral arteries and cerebrospinal fluid (CSF) pulsatility, as well as invasively determined CSF-pressure pulsatility were undertaken in conjunction with whole-brain volume quantifications in healthy older individuals [5]. The findings revealed a negative relationship between pulsatility and hippocampal volume, suggesting that older individuals with higher cerebral pulsatility, likely due to lower arterial elasticity, have smaller hippocampi. We argue that hippocampal volume reductions in relation to pulsatile stress reflect detrimental effects on vascularization and dendritic complexity. Evidence from animal studies confirm that the hippocampus is highly