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Abstract

The doctrine of leader centrism, supported by the concept of *methodological individualism*, dominates contemporary accounts of leadership in education and is generally applied as the *default* option that explains how organizations such as schools function. We argue that methodological individualism is not defensible and that as a result, the explanatory value of leadership is an open empirical question, not a default option. Leadership, and especially problem-solving, is always exercised under a set of constraints. Making the study of these constraints the focal point for determining leadership not only requires the resources of sciences not usually employed in leadership research, but leads to a reconceptualizing how leadership ought to be studied. In this paper we identify three broad contexts that help determine the constraint sets that define problems and their solutions: 1. The physical world that constrains what we are and how we think; 2. The social world that exerts constraints insofar as a system of education is bound by constitutive and regulative rules, that require a social epistemology for solving problems in organizational contexts and 3. The individual and the

scope of agency given our naturalistic account of cognition, which includes an account of emotion as necessary for rational decision-making to occur at all. A defensible theory of educational leadership, we argue, must incorporate context as sets of constraints and develop empirical procedures to investigate context. Only after investigation is it possible to determine who or what the unit of leadership was, or whether leadership occurred at all. There are no default options.

Key Words

Leadership; context; constraints; distributed cognition; supervenience; methodological individualism; agency; structure.

The Importance of Context for Leadership in Education

Introduction

The doctrine of leader centrism dominates contemporary accounts of leadership in education and is generally applied as the *default* option that explains how organizations such as schools function. We take issue with this assumption and argue in this paper that an important theoretical background to leader centrism is the tacit acceptance of *methodological individualism* as a feature of explanations of social functioning. We argue that methodological individualism is not defensible and that as a result, the explanatory value of leadership is an open empirical question not a default option.

Leadership is multifaceted and has many goals, and is always exercised under a set of constraints. It is the study of those constraints that are to do with leading for the purpose of solving problems, that defines our account of context. By focussing on problem-solving and

decision-making as the key activities of school leaders, we shift the discussion to the epistemology of cognition in organizational functioning. We argue that it is an open empirical question about what counts as the unit of leadership: individual, group, network, organization, society. This makes context the deciding issue, and because context changes, the idea of a default option drops out of the explanatory picture. As a theory of leadership always exists in a specific context it is therefore required in order to make defensible inferences from standard empirical methodologies. Justifiable conclusions about what counts as a unit of leadership are reached only after theory-driven empirical investigation, never before.

Broadly speaking, we distinguish three main contexts that help specify the constraint set under which problems are defined and their solutions worked out: (1) *The physical world* and the constraints it exerts over humans and their physical natures, naturally including the architecture and *modus operandi* of their brains. We thus extend our naturalism into cognition and draw on the findings of cognitive neuroscience that extends the context of cognition to include emotion. (2) *The social world* that exerts two sets of constraints insofar as (a) a system of education within a particular jurisdiction is constrained by both constitutive rules and regulative rules that, for example, define "teacher" and "teaching practice". What is also required is (b) a *social epistemology* for a theory of problem solving in organizational contexts. (3) The third broad context is that of *the individual*. Just as leadership is constrained by the natural and the social world, it is also constrained by the scope for human agency. Our naturalistic account of decision-making includes an account of emotion *as integral to a defensible account of rationality*, a fundamental point often overlooked in the decision-making literature. A critical focus on the individual, therefore, can result in seeing the unit of leadership as extending well beyond individuals and into groups and organizations. With context as a determining factor in how leadership is understood, and if problem-solving and decision-

making are central, then we infer that organizations are best understood as extended cognitive systems.

The taxonomy of contexts we outline here has considerable ramifications for understanding, exercising and researching leadership. In all things leadership, context matters.

Leadership, Explanation, and Methodological Individualism

For its first issue of Volume 32, 2004, the journal *Educational Management and Administration* announced that it had changed its name. It had added *Leadership* to the title. There were various reasons for this change but in general, as the editor explained, since the late 1990s "leadership has been in the ascendancy" (Bush, 2004, p. 7). Various reasons were cited for this ascendancy. Our own view is that it was a consequence of perceived weaknesses in the previously dominant paradigm of systems theory as an account of organizational functioning. As a grand theory, systems theory had come under sustained attack for its pretensions to be a science of organizations. Of more serious import, however, was its fundamental assumption that systems, after disturbance, have a tendency to return to an equilibrium state. This assumption was at odds with the reality of large-scale system-wide reform of educational management occasioned by the demands of neo-liberal public sector management reforms.

This shift also ushered in a less noticed but deeper methodological change. The conceptual categories employed in accounts of schools as social systems are ones that Durkheim would recognize as part of his claims for sociology as a distinctive discipline, particularly one not reducible to individual psychology. In *The Rules of Sociological Method*, he claimed with emphasis that "A social fact is … every way of acting which is general throughout a given society, while at the same time existing in its own right independent of its individual manifestations" (Durkheim, 1895/1958, p.13). Elsewhere he argues that "There can be no sociology unless societies exist and … societies cannot exist if there are only individuals"

(Durkheim, 1897/1951, p. 38). In an open systems view of schools, the categories of the broader context would include demographics, socio-economic conditions, linguistic and cultural factors. Institutional factors would include educational policy, social arrangements of governance, and funding arrangements defined over school organizations. Within the school, a process oriented framework of inputs, outputs, transformations and feedback loops would operate on such social categories as cohorts, classes, staff, parents, and agencies for support.

Within the so-called Theory Movement of the 1950s in educational administration, the principal virtue of a social systems approach was that it was believed to meet a fundamental requirement of any good science: it permitted for formulation of law-like generalizations, albeit in restricted domains. A social science of schools promised to be scientific.

The main historical alternative to this approach to explanation in social science is the account offered by Weber. For Weber (1947/1964, p. 88) "An action is social insofar as, by virtue of the subjective meaning attached to it by the acting individual (or individuals), it takes account of the behaviour of others and is thereby oriented in its course". To explain social phenomena adequately, we need to offer an explanation in terms of the actions of individuals whose actions are presumed to be rational, or reasonable. It is behaviour for which a person's reasons for engaging in it are central for explanation. "[A] subjectively understandable orientation of behaviour exists only as the behaviour of one or more *individual* human beings (Weber, 1947/1964, p 101, emphasis in original). In order to meet this "understandable" requirement of explanation for social facts, Weber's individualism requires that accounts of social facts must be reducible to the understandable behaviour of individuals. Moreover, Weber's reasons-oriented version of "understandable" rules out explanations of behaviour in terms of causes such as those involving "a collection of cells, as a complex of bio-chemical reactions…." (Weber, 1947/1964, p 101). Even when these can account for uniformities in behaviour, the behaviour "is not subjectively understandable" (Weber, 1947/1964, p. 101).

Views of leadership that dominate the scene today, for example transformational leadership, instructional leadership, ethical leadership, are mainly Weberian in these two senses. They are individualistic and their theories of cognition that drive leader-agency are reasons oriented. What makes Weber's views of social explanation an example of methodological individualism is the following claim:

> When reference is made in a sociological context to a "state", a "nation", a "corporation", a "family", or an "army corps", or to similar collectivities, what is meant is, on the contrary, *only* a certain kind of development of actual or possible social actions of individual persons. (Weber, 1947/1964, p. 102, emphasis in original).

Our objection is to the claim that all explanations involving social categories can be reduced without remainder to explanations of the actions of individuals. One consequence of our objection will be a restoration of the causal importance of contexts, especially social structures, that might otherwise not figure in an individual's reasons for acting.

In setting out our position on leadership we draw a number of distinctions. The first is between explanation and ontology. When philosophers say that a coffee cup supervenes on a collection of individual molecules, what this means is that no change in the coffee cup can occur unless there is some change in the collection of molecules. More generally "A set of properties A supervenes on another set B just in case no two things can differ with respect to A-properties without also differing with respect to their B-properties" (McLaughlin and Bennett, 2018, p.1). The expression "just in case" is to be read as "if and only if". In the instance of coffee cups, whose A-properties are commonly described in social and functional terms, for example, "an artifact used for the purpose of drinking coffee", its ontology is entirely physical. But if we were to ask why it has the shape it has, we might regard as satisfactory an explanation that says, for example, "so it can be used to drink coffee from". The difference is that supervenience may be compatible with the ontological reduction of A-properties to B-

properties but permit the explanation of A-properties in terms of other A-properties. So, when it comes to collectivities that have the properties of nations, families, or corporations, these might have an ontology of individuals (or cells, or molecules), but be explained adequately by the properties of other social-level described entities.

On matters of ontology we are scientific realists championing a physicalist ontology. But on matters of explanation we defend moderate methodological holism. This means that we accept the advantages of social-level explanations where they should be advanced but individual-level explanations where there may be advantages. Later, we shall give an example of the advantages of a collective, distributed, process of school decision-making over one that is individualist and leader-centric. However, in general, we think that neither holism nor individualism should be the default position on explaining organizational functioning. It's an open empirical question and treating it as such allows a wider range of factors to be counted as relevant. Concerning Weber's views on cognition, we are more sanguine about the developing prospects of lower level processes having explanatory value for higher level descriptions of cognition. Our moderate methodological holism, applied to cognition, leans towards cognitive neuroscience and its causal models as doing better, in some respects, than Weber's more folk-theoretic view of rationality. We use the example of emotion in rationality to illustrate this.

When it comes to leadership, arguments against methodological individualism, that is the claim that explanations of social facts and processes always reduce to explanations in terms of individual actions, show that leadership is not intrinsically individualist, or leader-centric. The most appropriate account of leadership may depend on the wider context of organizational purposes, wider social structures and constraints, and tasks at hand. We turn to these arguments now.

Initially, it is worth noting that a lot of macro, A-properties, admit of ready explanation without recourse to the micro, B-property details that the macro properties supervene on. For

example, the trajectory of a socially defined physical object like a football can be known without calculating the trajectories of all the air molecules within the football because these all average out to produce no effect on the gross body calculation. Or when we are explaining why a group of containers possesses the macro property of holding a litre of liquid, it may be sufficient to appeal to a macro property such as geometry rather than the micro-physical detail of each container.

There are many arguments against methodological individualism. (For a sample see Heath, 2015; Zahle, 2016; and Zahle and Kincaid, 2019.) Here we focus on three. The first is commonly referred to as the argument from multiple realizations. A school may be made up of a certain number of individuals. But for the social category of "school" the individuals will differ from school to school. That is, there is no one reduction that exists for the social category. A possible reply to this argument is that we can treat schools as individual tokens of collections of particular individuals, not as types as is the case with categories. So, the token "school 1" reduces to "collection of individuals 1", token "school 2" to "collection of individuals 2" and so on. The problem with this strategy emerges when we try to explain why we did not call "school 2" something else, such as "corporation 1" or "third army". If the collectives are, strictly speaking, merely tokens, then the bases for token individuation preclude an answer. But if there is an answer, some basis for specifying a commonality that groups the tokens into a kind, it would be something that specified a social kind: perhaps something like "an organization authorised by the state, or jurisdiction, to engage in education". In explaining why a group of organizations are schools, we get a regress to social facts and practices: organization, state, jurisdiction, and education.

This is our second argument, well-known in the literature from Mandelbaum's (1955) "bank teller" example. In arguing that social facts that make use of "concepts which are used to refer to the forms of organization of a society cannot be reduced without remainder to

concepts which only refer to the thoughts and actions of specific individuals" he imagines the case of withdrawing money from a bank (Mandelbaum, 1955, p. 307). Understanding "bank teller" backs up into "bank", and money into "legal tender" and the withdrawal as part of a "contract". The explanatory regress of social properties does not go down to the properties of individuals upon whom the social supervenes. It stays at the social. Lukes (1968, pp. 124-127) makes a related claim by arguing for the social-ladenness of individual behaviours. Lukes's target is Weber's account of understanding. If we are trying to understand behaviours in this sense, we need to do better than explaining just bodily movements. Those bodily movements might be social actions such as voting, or writing a cheque, or saluting. The same applies to many of the actions that school leaders perform. Unfortunately, unreduced social facts and practices are required as a condition for making the methodology machinery of individual explanatory reduction work.

Our third argument touches on the broader issue of structural realism. (Kincaid, 2008.) Many of the actions that people perform in schools are performed by virtue of defined social roles. These roles are able to confer causal powers, and causal limits, on the individuals and groups that occupy them. (For the agency of groups, see Pettit, 2007.) That is, a person's or group's capacity to exercise influence is sustained partly by real social structures that extend beyond the person or group to the broader social processes that create these structures. Many of these roles are created in jurisdictions by a combination of constitutive and regulative rules. (Searle, 1995, 1998.) For example, the definition, qualifications, and selection of people for the role of school principal are mostly specified constitutively, with selection decisions often being made by a committee operating under constitutively defined due process procedures for group agency. Later we shall specify more closely a realist case for structural realism and how it might operate as a set of constraints on problem-solving.

For now, we should note a further role-like set of causal affordances and constraints that possess no jurisdictional force but employ the same apparatus of collective intentionality. These are roles associated with culture, ethnicity, language, and religion. But they can attenuate out to school microcultures, or patterns of living associated with socio-economic status, or geography, or education. These create structures that are also relevant to determining what leadership can accomplish and need to be integrated into both theoretical and empirical accounts of successful leadership, or problem-solving, beyond a focus on leader-centric individualist accounts with their focus on appraisal and accountability.

The above arguments against methodological individualism do not rule out the explanatory value of accounts of organizational functioning in terms of the actions of individual leaders. Rather, they are aimed at denying that kind of explanation as the default option. They are intended to leave open the question of the most appropriate unit of leadership along a continuum of possibilities from leader centrism to no-leadership. They also signal the causal significance of wider social structures in determining what leadership units can do, factors that diminish reliance on agency dominated views of leadership efficacy.

Leader Cognition De-Centred, Distributed, and Scaffolded

In the previous section we laid out some objections to methodological individualism and highlighted three arguments in particular – the argument from multiple realizations, the inability of reducing social properties to properties of the individual, and we drew attention to issues of structural realism in terms of the specific social roles people occupy, such as principals, that confer both causal powers as well as limits. In this section, we address a problem that has beset leadership theories from their beginnings: how to account for the role of contextual factors in the definition and exercise of leadership.

While contextual factors – socio-economic, financial, legislative – have always been acknowledged as presenting complex constraints on leadership and organizational functioning (e.g. Vroom and Jago, 2007; Bossert et al., 1982; Lakomski and Evers, 2020), the centrality of leader cognition has remained intact, and the tension between contextual constraints on leadership and leader centrism has remained unresolved. We argue that broadening the traditional notion of cognition implied in leader centrism to a conception of cognition as distributed eliminates the tension between external factors and leader cognition in that distributed cognition encompasses individual minds/cognition *as well as* the contexts in which they operate. Drawing on the resources of cognitive science thus further undermines claims of methodological individualism by revising the very notion of cognition and how it works.

We move from the traditional view that cognition is located exclusively "in the head" to a position that considers cognition as fundamentally distributed in that it takes place, and is generated, in the reciprocal interactions between people, artefacts and other resources in the environment. Cognition is not a singular, fixed entity, but is better understood as a *dynamic system*.

The origins of the "cognition in the head" view are many and varied – from Plato's Forms or Ideas to the work of René Descartes, a view central to our modern understanding of ourselves as human agents in possession of conscious reason. What makes us special on this view is the ability to reason whose highest expressions are exemplified in language use and mathematical reasoning. Understood in this specific way, reasoning or thinking is equated with the ability to use mathematical symbols, and symbols in general, an abstract ability that is said to owe nothing to the physical body; it all happens "in the head". The idea that mind and body are radically separate entities is still deeply embedded in Western thought, in what Churchland (1988) called *popular dualism* (a modern version are Popper and Eccles, 1985). It is surprising

that the theory of the disembodied mind continues to have adherents because its plausibility is easily challenged.

If mind and body were indeed substantively different entities, then our ability for rational thought could in principle never be seriously threatened by anything physical. How a physical entity can "interact" with a non physical one is the central question that still awaits a convincing answer. In the meantime, however, the empirical evidence is mounting that we can indeed "lose our minds" when the brain suffers significant trauma. Injury to the physical brain can have bad consequences for our ability to think rationally, and if severe enough, can destroy this ability altogether. We can also change our characters, and literally become a different person, as we know from the remarkable story of Phineas Gage (Damasio, 1994). So for us to be able to think well, or think at all, our brains must be in good working order. Furthermore, in order to learn, there must be avenues or ways that allow us to do so. On the disembodied mind thesis, this is not possible as the mind is deemed accessible through direct introspection. On this account it is impossible to learn how to acquire good judgment, learn to manage change, and so on, features believed essential to good leadership.

Adopting a naturalistic approach to studying the mind/brain makes available the immense resources of many sciences – from cognitive/cultural anthropology, biology and evolutionary theory to cognitive and affective neuroscience, to name just some. All these provide compelling evidence for how and why human brains developed the way they did, what the architecture of the modern brain looks like and how it works (e.g. Dunbar and Shultz, 2007; Davies, 2010). In addition, improved neural net modelling provides a clearer picture of neural activity itself (Evers, 2000). As a consequence of such collective scientific knowledge, the idea of a dis–embodied and de-contextualised mind becomes ever more eccentric. Just consider some recent technological innovations, such as brain-computer interfaces (intracortical devices) that use neural information, that allow sufferers from tetraplegia or locked-in

syndrome to communicate, wonderfully expressed in Jabr's (2012) re-purposed Cartesian phrase "I think, Therefore I Spell". (See also Sorger et al., 2012; Birbaumer et al., 2003). Furthermore, brain-computer interfaces have also been successful in helping control external devices such as a tablet (e.g., Nuyujukian et al., 2018), and the advances in neuroprosthetic devices make it increasingly possible to correct disorders that affect mobility (e.g., Nicholelis, 2012; for an overview of work in the domain of brain computer interfaces see Brandman et al., 2017). The stunning insight derived from these examples is that humans, curtesy of the neural activity of their brains alone, are directly able to control aspects of the world via technological devices, that is, to act rationally, in the absence of language or any type of symbolic representation.

We are what Clark (2003, p. 5) calls "natural-born cyborgs", that is, human-machine hybrids which can go as far as involving the "physical merging of flesh and electronic circuitry". But while the examples cited here are extreme cases, our brains' interdependence on external, humanly created artefacts for the solving of problems large and small is evident everywhere – from the humdrum application of pencil to paper to solving an equation to computer–assisted medical procedures. *Cognition is always scaffolded.*

Considering the traditional inside/outside boundary of cognition, with all relevant cognitive activity presumed to go on inside the skull/brain, the previous examples demonstrate that such a boundary is rather more fluid, thus opening the door to a much broader notion of cognition. If all cognitive activity is distributed in the way described, important questions emerge regarding its nature. What would we rule "in" and what "out" as being cognitive, and what criteria would we apply? For example, would we count a "thought translation device" (Birbaumer et al., 2003) as part of cognition itself? And what about the individual mind/brain? What role would it play, if any, in such an extended view of cognition? In other words, what of "leader cognition?" Different answers have been offered by two prominent theories of

cognition: the *Extended Mind* (EM) hypothesis (Clark and Chalmers, 1998; Clark 2003, 2008) and the theory of *distributed cognition* (DC) (Hollan et al., 2000; Hutchins, 1996, 2014).

Importantly, both theories represent an important shift of focus from the inner workings of the mind/brain to the features of the external, social, world, and assume that the unit of analysis for cognition is composed of the interactive relationships between brain, body and world. Of the two theories, the theory of distributed cognition draws extensively on ecology and cognitive anthropology, emphasizing cognitive practices, and its focus is at the system's level which includes both humans and the artifacts they use to solve problems, from ship navigation to teaching reading. Both components are *integral parts of the cognitive system.* As problem solving always happens in specific cultural contexts the cognitive system is best described as the *cultural ecosystem of human cognition* (Hutchins, 2014); what matters is to understand the *organization* of whatever cognitive ecosystem is under investigation. It is not assumed in DC that cognition is an extension of the mind, in distinction to EM, where mind/brain continues to play a central explanatory role. Therefore, questions of boundary and brain-based cognition, important for EM are not of particular concern for DC as it focuses on cognitive *systems*. It is this emphasis that gives DC an edge over EM because cognitive systems with their culturally evolved practices are amenable to empirical study while an extended *mind* (or cognitive extension) is not (see the exchange between Hutchins, 2011 and Clark, 2011).

The evolution of cognitive *systems* is intimately connected with the evolution of our brains. Humans have unusually large brains for body size, and the currently most accepted explanation is Dunbar's (1998) "social brain" hypothesis according to which primates evolved large brains to maintain social cohesion and avoid predation (rather than food foraging). So, the complexity of changing social situation shaped our brains all the way back. Fast forward to what we learn from current neuroscience: brains, although large and computationally powerful, have their limits in terms of memory and computational capacity. They are metabolically

expensive and cannot store large energy reserves (Aiello and Wheeler, 1995). Thus, when we are faced with too many options at once, our brains get overloaded and task performance declines (Sapolsky, 2018, p. 49). To reduce the energy cost for the brain it is much easier to resort to pen and paper, abacus, or calculator to solve a mathematical problem. While this is a simple example, it again indicates the interconnectedness of cultural artefacts and cognition where one cannot be separated from the other in the solution of a problem. *Cognition is truly encultured*. (Menary, 2010).

In the next section, we consider some consequences of distributed cognition for agency, and why emotions are necessary for rational decision-making.

Agency, Emotions, and Educational Decision–Making

Understanding cognition as a distributed dynamic system means that it is no longer possible to consider human agency as an individually "owned" capacity as was traditionally assumed. An individual brain, such as the principal's, while being part of the cognitive ecosystem, cannot be assumed to be its centre *a priori*, an assumption that prevails in leader-centric accounts where leaders are cognitive centres regardless of purpose or context (Evers, 2016; Evers and Lakomski, 2013). Rather, cognitive systems can have one or several cognitive centres subject to what particular problem is to be solved and different combinations of cognitive resources are required that usually also include structural constraints beyond individual control. As a result, the locus of agency shifts. Attributing agency (and responsibility) in such a wider cognitive framework, is much more complex as it requires close attention to situational factors, and can only ever be determined – if at all – after analysis, never before. This analysis goes against the common grain.

Traditionally, as Nisbett (2015) has shown, we have overemphasized *dispositional* factors (of leaders) such as preferences, personality, and traits, with the regrettable result that "The failure to recognize the importance of contexts and situations and the consequent overestimation of the role of personal dispositions is ... the most pervasive and consequential

inferential mistake we make. … the *fundamental attribution error*" (Nisbett, 2015, p. 34). Rather, who, or what combination of factors, account for solving a particular problem is difficult to determine and will shift with the problem and its contexts. But this does not mean that individual responsibility/or agency no longer applies. It just becomes harder to determine. Jumping to conclusions in regard to attributing success or failure, for example, is a mistake because it misrepresents real but difficult to identify causal relations.

There is a further difficulty when considering the notion of agency. As commonly used, "having agency" presumes the key notion of a (fixed) Self, the 'I' that is responsible for my conscious choices. Cognitive science, however, tells us different – Self is not what we think it is.

Not surprisingly, Self is grounded in our biology, having emerged through various stages of brain evolution, with the emergence of the 'I' the icing on the cake of our cognitive evolution (Damasio, 2010; Donald, 1993). Self is a process that emerges from the coordinated efforts of the body and through many distributed brain structures; as a consequence, there is no one brain centre or location that produces the Self (e.g., Vogeley and Gallagher, 2011). There is no central controller, or homunculus, that coordinates mental activity. Self itself is a distributed system; whatever affects the brain affects the Self, and in cases of serious brain trauma, the Self literally loses the sense of itself. Being able consciously to identify myself as 'I' and as having a Self is a useful construct or fiction that helps organize and explain mental phenomena in our engagement with others in the social world. A fuller account of Self incorporating social, individual, and molecular levels in addition to the "synaptic self" (LeDoux, 2002) still awaits development. (But see Thagard, 2014).

While the notion of a Self is a useful psychological construct that "bundles" distributed cognitive activity, the very fact that we can act in the world at all, one characteristic of our biological being, is the role of emotions in making decisions. This essential feature is underacknowledged, not only in educational leadership. To be clear, emotions are not understood

here in the descriptive sense of folk categories, as generally employed in education and educational leadership research. (See Berkovich and Eyal, 2014; for a recent approach see James et al., 2018). Rather, the issue is scientific analysis of what emotions are and where they originate. We thus offer an answer to Yamamoto et al.'s (2014) request to examine the role of emotions in leadership and, in doing so, help strengthen the scientific status of educational administration theory.

Although emotions have always been considered a central element of human nature, they have traditionally been portrayed as detrimental to reason, a relationship enshrined in the reason/emotion dichotomy that was assumed to be an accurate depiction of human nature. Recently, the scientific study of emotion/s has become more prominent, as evidenced in the new field of *emotion science* that concentrates on one side of the (generally accepted) dichotomy. Emotion scientists are split between researchers who advocate emotions as "essences" and "natural kinds" and universal, (e.g. Ekman, 1999), and those who do not, and who prefer to see the widely observed commonalities in emotion expressions as resulting from social and cultural conventions (de Gelder, 2017). There is general agreement though that in some way emotions are "brain-based", but there is no accepted position on how or where emotions are formed in the brain (Barrett, 2017; Lindquist and Barrett, 2012). Here, affective and cognitive neuroscience provide more direct answers including what emotions are "for".

Put in the most basic of terms, emotions allow us to live because they motivate us to act. Every act or decision is characterized by a weighting or *valence* that is either positive or negative. This basic feature of the biological organism allows it to avoid pain (and extinction = negative valence) and to choose that which is optimal for the satisfaction of its needs (and survival = positive valence). The body signals that do this weighting are what Damasio (1994) called *somatic markers* that function like traffic lights that either flag a warning, or signal to proceed. (Bechara and Damasio, 2005; Bechara, 2004). This very ability allows us to "pre-sort", at a subconscious (gut feel) level, which action to pursue and which to avoid given the multitude of all actions that are logically

possible. The importance of this ability can hardly be overstated. Without it, there is an exponential explosion of possibilities, and in the absence of any weighting for or against, choice is pointless, and we might as well flip a coin which is about as far removed from rational decision– making as is possible. In the event our implicit judgments become conscious – they don't always – we may, or may not, correct our initial gut feeling after conscious deliberation. Emotion is intricately connected to acting, and without emotions to direct us, we could not make any rational decisions at all. Rationality depends on emotions, and there is no agency without emotions. For present purposes, the most important outcomes of neuroscientific research on emotion/s is that (a) there are no separate emotion and cognition neural pathways in the brain; (b) the names we give emotions are cultural and social conventions; and (c) emotions are malleable, are "constructed" during social interaction and arise "in the moment".

As important as it is to understand, in a rough and ready way, what the "emotional brain" is, the neural basis for emotions is not all there is to how we feel and understand emotions. Just as Self needs to be understood as multifaceted, emotions likewise, we argue, need to be considered at multiple, interconnected, levels – the psychological, sociocultural, neural and molecular (Thagard, 2010; Thagard and Schröder, 2015; Rogers et al., 2014). In addition to understanding the causal, neural level, we cannot (yet) do without psychology because it provides us with folk psychological categories and concepts such as love, fear, disgust, or envy to describe emotional experiences in everyday life for which we do not yet have another language. Add to this the sociocultural level because emotions are shaped by the social relations in the contexts in which we live, while the molecular level deals with such things as neurotransmitters and their roles in generating emotions. This multilevel view of emotions suggests that emotions are best understood as (multi-level, multi-faceted) *constructions*. By this we mean that they are neither hard–wired and universal, nor are they completely socially constructed. Emotions are malleable and emerge (or are "constructed") during social interaction and arise "in the moment". We can say that emotions are macro phenomena that

supervene on the neural micro detail. This just means that no change in emotion can occur without a change in the micro detail; and when the micro details change, as in change in social interactions, so does emotion.

All decision–making, then, including the educational, is always "weighted" in the sense in which we discussed this. The individual educator, for example, is invested in what decisions are made regarding the most appropriate provisions for student learning during COVID-19 in that she strongly believes that students' emotional welfare is as important as their learning. S/he values one option over others. And so it is with every person involved with the decision. Coming to a *good*, rational, decision when a team or group of teachers with varying points of view are involved requires avoiding confirmation bias on one hand – the principal decides for everyone which is quick but might not lead to an optimal solution – and taking into account the needs of the groups' values, a longer process that might lead to a better outcome. Decision-making takes time, we are fallible decision-makers, and what we need is a methodology of intelligent trial and error that increases the likelihood of getting the right solution and thus increases the growth of knowledge in how to go about problem solving. In the following section we suggest just such a process.

Leadership, Problem-Solving, and Social Epistemology

A central task of leadership, we noted earlier, is decision–making. In this section we argue that for epistemological reasons to do with fallibilism the task needs to be reconstrued in terms of problems-solutions trajectories, and the unit of leadership best suited will more likely be a group rather than an individual.

In making educational decisions it would be very helpful if our social science contained useful generalizations that could be used to predict what would happen if we made this or that sort of decision under given conditions. Unfortunately, the complexity of "given conditions",

or more generally context, erodes the epistemic value of any purported generalizations. This can be the case even in physics. For example, the trajectory of a ballistic projectile launched at some angle to the earth's surface would ideally take the shape of an inverted parabola, largely because gravity is an acceleration, or second derivative of distance moved with respect to time. But context posits the effects of air resistance which may not be constant because air blows and swirls and can also affect the trajectory of objects by virtue of their shape. And gravity can vary in relation of a projectile's distance from the earth's surface. While the situation regarding precision is more hopeful in ballistics, the difficulties are severe in social science.

A number of influential theoretical arguments against prediction in social science have been proposed over the years. Popper raised two difficulties that are fundamental. In the first he argues that the future growth of knowledge cannot be predicted. But because the future state of a social system will be strongly influenced by the growth of knowledge, that state therefore cannot be predicted either. (Popper, 1957, pp. xi-xii). This formed the basis of his case for piecemeal social reform. We are likely better to anticipate the consequences of small changes, and in the case of surprises, we are more likely to figure out what went wrong in a complex system if the changes were small. (Popper, 1957, pp. 76-85.) In the second he argues as follows. Suppose we have perfectly accurate social laws, and perfect knowledge of all initial conditions. Formulate these as axioms in a social science. Use the laws of deductive logic to derive the future state of a social system. But by Gödel's theorem proving the incompleteness of any axiomatic system strong enough to give elementary arithmetic, there will be some description of a future state of the social system that will be true but cannot logically be derived from the axioms. Hence, even under perfect knowledge conditions, social prediction cannot be achieved. (Popper, 1950.)

Scriven (1965) produced a theoretical argument that human behaviour is in principle unpredictable. Shorn of technicalities it says that whatever information and calculation

resources that are available to a predictor to predict the behaviour of an avoider will also always be available to some avoider for reproducing the same result thus enabling the thwarting of the prediction. Lewis and Richardson (1966) in response argue that the assumption of equal availability is an assumption that Scriven makes without proof, and so his conclusion does not follow. However, if Scriven's assumptions did hold, we would come to the logical paradox of the predictor being able to predict the avoider's avoidance of the prediction. Rummens and Cuypers (2010) offer a corrected proof that also avoids the logical paradox.

For our purposes, it is sufficient to note that we never possess enough knowledge to predict with certainty all the consequences of a leadership decision. The usual response to this epistemic condition is not to think of the behaviour of social systems in terms of exceptionless regularities, but rather in terms of models, often idealized, that capture patterns of behaviour. The obvious example of this is belief/desire folk theory. This theory is not intrinsically individualist, often making reference to social categories. For example, the claim: the government wants to support a policy of education for all because it believes it will advance social justice and improve economic performance. The claim supervenes on a vast amount of causal detail, but works well enough as a simplified model explaining government policy. One reason the model works to the extent it does is because, ironically, it draws on a key feature of arguments for human unpredictability, namely human cognition. In his defence of a version of institutional theory, Searle argues that what sustains social facts and institutional structures and processes is, in the first instance, a system of constitutive and regulative rules (Searle, 1995). Constitutive rules are those that define a practice or social fact, and bring it into existence. Games are the classic case. The rules of cricket, or golf, define the game. Many social structures exist by virtue of constitutive rules whose origin lies in what Searle terms "collective intentionality" (Searle, 1995, pp. 43-51). Regulative rules are those that regulate an existing practice. Driving a car is a good example. The practice exists but needs to be regulated by a set

of rules that make driving safe. These rules, and other instances of collective intentionality contribute to a great deal of the patterning that makes organized social life possible.

We can now apply some of these considerations to problem-solving. Following Nickles (1981) we may regard a problem as comprised of a set of constraints that includes the demand to solve it. The constraints are a mixture of those that are physical, such as material resources, plant and equipment, those that are social structures, such as rules that define or regulate roles, budgets, and affordances and limitations on what actors can accomplish, and cognitive resources, such as knowledge and inferential powers. These all come to bear on problems in schools and what can be done about them by leadership.

Take the problem of falling enrolments (analysed in detail in Evers and Katyal, 2008). A hard constraint is that a school can be closed down by the government once total enrolments fall below a certain number. Since social science gives no one answer for solving the problem, the obvious heuristic is to try the easiest option first: mounting a publicity campaign in the local district. But suppose this fails because the school discovers that it has a poor reputation in the district for discipline, or learning outcomes. The school needs to do something about these matters before it can make progress on the enrolments problem. There are various proposals for dealing with these issues too, but again, fallible social science and context dependence can prolong the process. This process was first described by Popper (1972) as a pattern for the growth of scientific knowledge. He proposed the following schema:

P1 => TT1 => EE1 => P2

P1 is the initial problem, TT1 is the first proposed tentative theory to solve it, EE1 or error elimination, is the testing of the tentative theory to see if it works, and P2 is a resulting new problem. There is now a growing body of research that investigates the use of this schema for problem-solving in schools (Chitpin and Evers, 2012, 2015, 2019; Evers and Katyal, 2008;

Evers and Lakomski, 2015; Katyal and Evers, 2014). This methodology of intelligent trial and error has the advantage of being potentially self-correcting since it augments the resources of theory formulation with the additional resources of feedback. In doing so, it shifts the nature of decision-making away from a one-off approach and towards a trajectory, or series of "Popper Cycles". It is also independent of the unit of leadership, being able to be applied by individual leaders or leadership groups. There are, however, two considerations that tell in favour of the epistemic advantage of leadership teams.

Implementing a theory to solve a problem is an epistemic process that most often involves many hands. That is, those involved in the implementation are part of an epistemic team that is advancing the growth of knowledge, through providing feedback, required to solve the problem. A second reason for favouring groups concerns enhancing the self-correcting advantage of the model from the effects of confirmation bias. In a number of computer simulations of group decision-making, a group with a very strong leader, that is, one whose views are highly influential in changing the minds of others in the group, will result in the group being able to quickly make a decision, but only slowly correct a faulty decision (Hutchins, 1996, pp. 260-261; Evers, 2000). The problem is exacerbated in education where evidence can be ambiguous or only probative over a longer term. Computer modelers in social epistemology call confirmation bias induced by strong leadership the "royal family effect" (Zollman, 2007). The epistemic advantages of larger units of leadership include a wider range of possible tentative theories, a greater capacity for better feedback from implementation of tentative theories, and a lessening of the possibility of confirmation bias. This approach to decision-making as problem-solving trajectories requires an ethical infrastructure that counsels humility in the face of fallibility, tolerance and respect for alternative points of view, and a willingness to submit to evidence rather than authority. And it coheres with our account of educational leadership that sees units of leadership as distributed cognitive systems.

Conclusion

The discussion of distributed cognition affords us one further observation in regard to schools as organizations.

Consider the development, organisation, and application of COVID-19 appropriate teaching and learning resources – from school-based, in-class teaching and learning to on-line and remote education practically overnight across all curriculum areas. It is easy to see how intricately enmeshed minds/brains are not only with the technological tools available, the physical environment of different public and domestic spaces with their different affordances, but also with the other members of the school, and the wider school community: these together form a cultural ecology, constituted of all the things people do in interaction with one another, for the purpose of facilitating ongoing learning in radically altered circumstances. No social practice, be it teaching, learning, or leading, can be understood in isolation without consideration of context. Schools that have successfully adapted (and re-adapted) their teaching–learning modus operandi to meet not only COVID-19 regulations but also the needs of their whole school communities, have been able to do so because of the distributed yet integrated cognitive work of many who made individual and collective learning possible.

The perspective on schools as organizations that emerges from this discussion is that *schools are cognitive systems* themselves where the environment/organization boundary all but disappears subject to the cognitive resources for problem–solving being widely distributed across school and its communities. Understanding schools as cognitive systems, within the perspective of distributed cognition, allows us to see them as external manifestations of culturally evolved material structures of coordinated, collective cognitive activity. This is very different from seeing schools as either organisms or machines. The further implication is that problem–solving proceeds “from the ground up”, for problem solution is not dependent on the

principal's cognitive grasp but is a collective enterprise; and secondly, schools as cognitive systems suggests a different, *heterarchical,* organizational design, open to checks and balances and feedback loops to improve problem definitions and solutions. Whether a principal can in some circumstances count as a "centre", and whether any one centre is responsible for a particular problem solution are open empirical questions that can only be answered after investigation. There are no default options.

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