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Perceiving and Remembering Routine Action: Fundamental Micro-Level Origins

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In the contemporary research literatures on organization and on business strategy, routine is understood to be a distinct modality of organizational action – not merely the joint result of individuals making choices that maximize self-interest. As Herbert Simon (1996) pointed out, if this were not so, the observed stability of routines would merely be a reflection of the stable requirements of the environment within which individuals would be optimizing their behavior. When the environment changed, behavior would quickly follow and we should not expect routine's notorious 'resistance to change'.

However, this special issue affirms that routine is a distinctive mode of organizational action, and the title phrase 'micro-level origins' directs us to closer observation of the underlying individual processes that generate routine action. Correspondingly, the assumptions about those micro-level processes that we put into our theories of routine will shape theoretical derivation of the expected properties of routine action, and of the organizations whose distinctive capabilities (Dosi et al., 2000; Teece et al., 1997) rest on routine. Observation, theory, and theory-based intervention will all be affected by more accurate foundational assumptions. [1]

The full development of the relationship and its implications will not be simple. Habit is subtly connected to systems of emotion. It is different from, but can arise from, more deliberate and conscious action (Graybiel, 2008).

While there is much to be learned, there is already a great deal known. In particular, as individuals carry out their parts in organizational routine, they appear to rely sub- stantially on two psychological capacities that are fundamental components of the habit system: (1) procedural memory for our habits and skills, also referred to as non-declarative memory (Singley and Anderson, 1989; Squire and Kandel, 1999); and (2) action- specialized perceptual capability, that has been labelled in recent research as the dorsal perceptual system, in contrast to the ventral system.[2]

Unlike the human capacities for object recognition and for self-conscious reasoning about problems, which have been more extensively studied, non-declarative memory and the dorsal perceptual system are mechanisms that have relatively recently developed as foci of psychological study, exploiting both advances in imaging and the observation of brain-injured patients who lost some abilities but surprisingly retained others.

This work has shown that we have multiple systems of both memory and perception, and these systems have distinctive properties. Procedural (or non-declarative) memory plays a central role in our retention of how actions are performed. It corresponds to what we term 'know-how', in contrast to 'know-that', which is more strongly associated with declarative memory.[3] Our habits and skills – where the latter may be roughly defined as our useful and cultivated habits – are remembered using the non-declarative system. We have much reduced conscious verbal access to our know-how. It operates rapidly, with little demand on our conscious attention. It can occasionally be triggered inappropriately by circumstances that superficially resemble prior experience. It has a very low rate of decay, relative to declarative memory. Taken together, these properties imply that you have the speed of action required to successfully ride a bicycle, or conjugate verbs, and can do so while attending to other tasks. But you may be hard-pressed to say just how you do these things and – for the most part, fortunately – relatively slow to forget how you do them.

The dorsal perceptual pathway has a clear association with preparation for action. Indeed, one of the observations that led to ventral/dorsal distinction was a patient who had suffered specific damage to the dorsal pathway, who could readily distinguish presented objects based on their shapes, but who could not correctly take into account the shape of an object in preparing to grasp it (Goodale et al., 1994). Conversely, the patient DF, whose ventral damage prevented recognizing the shape of a stick, could nonetheless catch a stick when it was thrown to her (Milner and Goodale, 1995).

The distinctive qualities being documented for these psychological processes in the habit system have important implications for research on organizational routine. Common properties of organizational routines reflect those of the memory and perceptual systems used when individuals remember and generate their actions as participants in routines.

The work to establish these organizational of individual psychology developed first around the idea of procedural memory. Laboratory experiments that induce routine activity in a small group of subjects demonstrated that properties of routine activity, such as fast action, slow decay, and inappropriate firing could be traced to the development of procedural memories for action in the experimental participants.

The newer results on the properties of the dorsal perceptual system have not yet been carried into the organizational domain, but a parallel line of development seems very promising. As was the case with the earlier work on procedural memory, there is a strong alignment of known properties of routines with findings on the dorsal perceptual system in individuals and small groups. The dorsal system is heavily involved in preparation for, and guidance of, familiar actions, such as driving oneself to work (Custers and Aarts, 2010). Many of the informative results about dorsal perception have been established by studying disjunctions or illusions, in which the dorsal system is driven by situational cues to guide action inconsistent with verbally reported ventral perceptions of the scene (Milner and Dyde, 2003).

A number of psychologists (Rizzolatti and Sinigaglia, 2008; Warren, 2006) have argued that the dorsal system provides a mechanism for phenomena of affordance that were so forcefully advanced by the environmental psychologist J. J. Gibson (1979). He argued that we directly perceive something as 'sit-able' or 'climb-able' relative to our own bodies and that is part of how we recognize it as a chair or stair. This is in contrast to the view that we first recognize a chair or stair, and then retrieve further properties such as sit-ability or climb-ability. Gibson's view suggests that artefacts can play a much stronger role in organizing our actions. In his perspective, we see the experience-based action possibilities of a situation directly, in contrast to a much slower process of reasoning them out based on alternative behaviours and likely consequences. Since artefacts, such as tools and visual displays, play a significant role in many accounts of organizational routine (Latour, 2005; Pentland and Feldman, 2008), there is much research potential in a perceptual mechanism that provides a more detailed account of how such objects affect our organizational action, and includes an explanation of how they may sometimes 'misfire', overriding our reasoning about the requirements of a situation.[4]

A second role of the dorsal system is its contribution to anticipation, a hallmark of action sequences in individual skills and organizational routines. Even in patients whose ventral systems

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are damaged, the fingers widen appropriately long before the hand arrives at the object to be grasped. In the card game task that becomes a routine for experimental subjects (Cohen and Bacdayan, 1994), experienced players ready the card they will play next while waiting for the move they know their partner is about to make. The same mechanism can be seen in experienced teams on assembly lines as workers place items where their colleagues will need them.

Anticipation allows routine action to be more rapid as activities that prepare for a later step can be overlapped with a current step, rather than waiting for the starting point of the following step to be fully realized by current action. It carries risks, of course. Leaping towards the rim can look a little foolish if the basketball is never passed to you. But in recurring environments, such as team sports or surgical teams, such risks are usually far outweighed by the benefits of speed and relatively continuous mutual adjustment.[5]

Further, work on 'mirror neurons' in macaques (Umiltà et al., 2001) and humans (Rizzolatti and Sinigaglia, 2008) strongly implicates the dorsal perceptual system in understanding the intent of actions by others, an additional crucial aspect of routine.

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