

Technical Appendix: An Algebra For The Fundamental Operations of Functional-Perspectivism Considered From The Exterior Epistemic

Functional-perspectivism (FP) is divisible into an ontological side, i.e., function, and an epistemological side, i.e., perspective. The functional aspects are dealt with at length throughout this book. The perspectival aspects are embedded within the functional explanations presented throughout this book - The danger here is leaving the perspectival aspect of FP underdeveloped. This appendix is intended to partly rectify this problem by developing giving a formalized logico-mathematical basis to the perspectival epistemology of this book.

Buchler (1979) points out that “the character of a perspective is as important as its identity, and it can lend itself to idolatry as well as to exploration” (p. 118). The character of FP investigations and applications can be much improved if its basis can be referenced back to a formalized algebraic system to guide theory generation and empirical investigation that is done under the functional-perspectivist paradigm and worldview. In this algebra, which is extended to encompass the conventional research and theory approaches in organization science, i.e., rational-objectivism, as well as the fundamental operations of functional-perspectivism, four operations allowed. The first two operations are allowed epistemological existence and latitude within the space-time manifold by rational-objectivism

X interacts with (Interaction)

| holding constant for (Parameterization)

Rational-objectivism, referred to by Alliger (1992) as modified positivism, is normal science (Kuhn, 1996) in organization research and inquiry. Take for example a

conventional theory or research design that postulates or studies the functioning of a person or persons (p) at time (t). The context (c) in which the person or persons functions is left unstated. This theory or research design is represented in its essentials as

$$p \mid t \quad \text{[Expression 2.3.1]}$$

Stated in words, “the person(s), p, considered at time, t”. A good example would be an interest of a researcher in the intelligence of a person or persons at a given point in time. Note that p can be conceptualized or measured along one or more constructs or measurements of interest.

A second type of theory or design in conventional research in organization science is represented as

$$p \times c \mid t \quad \text{[Expression 2.3.2]}$$

Here the context (c) is conceptually defined and/or measured as well as the person(s) at a given point in time. An example here would organization researchers who hypothesize or measure personal characteristics thought to impact on, or interact with, aspects of the job or organizational context that are also hypothesized or measured.

The last two operations are those allowed epistemological existence and latitude within the space-time manifold by functional-perspectivism.

┌ marks the distinction between (Concatenation)

→ indicates a granularity shift in the direction of (Granulation)

These two operations will be entirely new to readers and so require further explanation.

The marking operation ┌ is proposed by G. Spencer-Brown in his *Laws of Form* (1994) as the formal means to draw a distinction within a conceptual, in his case, logical space. Most simply, we propose drawing on core principles developed in

environment-behavior psychology (Wapner, Demick, Yamamoto, & Minami, 2000) that p and c are in a transactional relationship that is represented in Spencer-Brown's system as

$$\overline{p} \mid c \quad [\text{Expression 2.3.3}]$$

The term inside the mark (i.e., p) is the marked state; the term outside the mark (i.e., c) is the unmarked state. An environmental psychologist might conceptualize the person, p, with some rigor in terms of a set of effectivities as actions (Heft, 2001), but in doing so would not forget that these effectivities are only meaningful when played out against an environment of affordances (Gibson, 1979) that resource these effectivities. In the above formulation, the affordances would be viewed opaquely through the lens of the effectivities, the affordances comprising the unmarked state and a part of the field of tacit knowledge (Polanyi, 1983) that surrounds the focal or marked state which is the subject of immediate attentional focus. Understood in perspectival terms, this form allows for the study of the person in context (p-in-c), a term borrowed from environment-behavior psychology (Wapner, Demick, Yamamoto, & Minami, 2000), from the person, p, as the figure or marked state with the context, as the ground or unmarked state.

One can reverse the perspective to

$$\overline{c} \mid p \quad [\text{Expression 2.3.4}]$$

However, the epistemic commitments of the knower change accordingly. The injunction (Spencer-Brown, 1994, p. 78 cf.) is now to “cross from context, c, as the marked state, to person, p, as the unmarked state”. The context, c, becomes the figure and the person, p, the ground against which the investigation, conceptual or empirical, proceeds. FP refers

to conceptual and analytic unit which results from concatenation for a specific theoretical, research, or applied question as the **concatenated ecological concept (CEC)**.

The indicator of extensional shift used in this formalized representation of functional-perspectivism is \rightarrow . Granularity (Zadeh, 1979) is a parameter of the functional entity that is co-determined by the grain-size of the descriptor and the area covering the scope of the context (Schmidte, 2005). It can be applied to the extension of both space and time. As defined by Bargiela & Pedrycz (2003) information granulation is “a process of abstraction in which we identify elements that are similar in terms of their functional, spatial or temporal proximity” (p. 235). Larger information granules have the advantage of representing the system under study at higher levels of abstraction, with the cost of omitting details that may (or may not) be important to the investigation under way. Through the use of smaller information granules, we can focus on smaller details of the system under study but require more of them to represent the same system. A functional entity is described at a level of lesser informational granularity if it is represented by a more general and abstract description of its elements; an entity is described at a greater level of informational granularity if it is represented by a more detailed, fine-grained description. For example and *ceteris paribus*, a description of the proximal context of the person-functioning-in-context is of greater granularity (contains more detailed information granules) than a distal description taking a wider perspective on the same context. Information granularity applies to both temporal and spatial questions (Bargiela & Pedrycz, 2003), permitting it to cover both aspects of the space-time manifold.

In a less formal sense and using a physicalist metaphor, the concatenation operator can be called **horizontal perspective** because it moves across the CEC at a constant level of conceptual and empirical granulation. Within the same metaphor, the granulation operator becomes **vertical perspective** because one proceeds through the CEC from a “vertical” direction, adumbrating it at varying levels of specificity, i.e., granulation, for the given CEC.

Three entities have been introduced in this book to describe human functionality within the space-time manifold: p = person; c = context; and t = time. In the conventional rational-objectivist paradigm, these entities are related by the existential operators \exists and $*$; in the functional-perspectivist paradigm by $\overline{\quad}$ and \longrightarrow . With a discussion of functional entities mention must be made of the epistemic states that these entities may assume. These states are indicated in the FP algebra by subscripts that set upper and lower limits of granulation or fix the level of granulation applying to a given investigation. The subscripts serve two purposes: (1) they locate boundaries around the conditions of measurement for the entities in a given instance; or (2) when fixed, specify a given set of measurement conditions for the entities for that instance. The subscripts, at least for the purposes of this study, are appended to the functional entities as follows:

(i) Person or p is studied in greater granularity (dimensionalized person perspective or p_d) or lesser granularity (p_w or whole person perspective); (ii) Context or c is varies from proximal, c_p , workspace of greater granularity to distal, c_d , workspace of lesser granularity (see Brunswick, 1956, for an in-depth and formative treatment of proximal vs. distal context); and (iii) Time or t, at a single point in time, t_s , to extended workspan, t_e , in terms of temporal granularity. For example, person(s) could be assessed along several

personality dimensions (p_d) without reference to their functioning in general and without reference to a specific work group, unit, or organization (c_d) with an instrument that is administered on a single occasion (t_s). Such a design is in fact quite common in organization research.

If a single case of person-in-context was studied from the person perspective and embedded within the proximal context and then the integrated unit of person-in-context was embedded within extended time in forward movement across the space-time manifold, the design algebra would be

$$\overline{\overline{p_w} | c_p} | t_e \quad \text{[Expression 2.3.6]}$$

This would be an example of the “purest” type of FP design because it takes the researcher most directly toward the synthetic root metaphors of contextualism and organicism as described by Pepper (1970). This design specification is however only one of many combinatorial possibilities for the three entities when the existential operators for concatenation and granulation are employed. Note that the status of entities as marked or unmarked states (figure or ground) depends on the shifting *direction of horizontal perspective* as concatenation proceeds from left to right within the conceptual design specification. The *specificity of the vertical perspective* will vary with the granulation of the entity (p , c , or t), as and when granularity of that entity becomes the substantive object of research attention. For example, granularity of context could be varied within Expression 6 by rewriting it as

$$\overline{\overline{p_w} | c_{p \rightarrow d}} | t_e \quad \text{[Expression 3.2.7]}$$

This expression incorporates both the existential operations of concatenation and granularity across the ecological representation of the p, c, and t entities.

The application of a pure F-P design (Chung-Yan, Cronshaw, Ong, & Chappell, 2005, April) renders moot at least the following issues that are of central concern to organization researchers, all of which involve interaction or parameterization of either the research question or data: (1) person-job fit (Edwards, 1991), person-organization fit (Westerman & Cyr, 2004), person-environment fit (Tinsley, 2000) or any other type of matching or congruence model that separates person from context and is thus nullified by the F-P use of horizontal perspective; (2) The levels of analysis “problem” (e.g., Chan, 1998) which is rendered moot by the use of vertical perspective; and (3) The need to use different methodologies to scale people and stimuli (Nunnally & Bernstein, 1994), an unnecessary dichotomy which is nullified through FP use of vertical perspective.

It is useful to contrast the present paper with a recent study into adaptive skills, contextual demands, and work adaptation by Chung-Yan (2005) which drew on traditional RO assumptions. Chung-Yan’s (2005) research would be described by the design algebra as $p \times c \mid t$. He found that adaptive skills frequently moderated the relationship between contextual demands and that a majority of these moderated relationships involved non-linear associations. In the case of the FP designs illustrated in this paper (or, at least, those portions of the design that are FP-based) both moderator variables and statistical non-linearities are absorbed into the existential concatenation operator; differing levels of analysis are absorbed into the existential granulation operator. As well, person and context are fused into a single ecological unit so obviating

the need for complex non-linear statistical analyses to relate these two entities after measurements are taken. FP is an alternative that radically simplifies of the overly-complex research methods, statistical analysis, and measurement models governing and regulating normal science across the fields of organization inquiry. Consequently, line-of-sight inferences to, from, and about everyday organizational phenomena are much easier to make.