

TEMPEST in a Gallimaufry: Applying Multilevel Systems Theory to Person-in-Context Research

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ABSTRACT Terminological ambiguity and inattention to personal and contextual multilevel systems undermine personality, self, and identity theories. Hierarchical and heterarchical systems theories are used to describe contents and processes existing within and across three interrelated multilevel systems: levels of organization, representation, and integration. Materially nested levels of organization are used to distinguish persons from contexts and personal from social identity. Functionally nested levels of representation are used to distinguish personal identity from the sense of identity and symbolic (belief) from iconic (schema) systems. Levels of integration are hypothesized to unfold separately but interdependently across levels of representation. Multilevel system configurations clarify alternative conceptualizations of traits and contextualized identity. Methodological implications for measurement and analysis (e.g., integrating variable- and pattern-centered methods) are briefly described.

Philosophers have been debating for centuries the meaning of the *sense of personal identity* (e.g., Hume, 1739/1878). This conscious sense of selfsameness has presumably stood in stark contrast to our perpetually changing “stream of consciousness” for as long as humans have had the capacity to reflect consciously on what Jaynes

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(1976) referred to as the “analog-I” (i.e., the mental representation of the self in context). The relations among the “sense of identity,” the “identity that is sensed,” and many other components of the person-in-context system (e.g., *contextualized identity*), can be understood clearly and unambiguously by defining them in terms of parts and processes that exist and function within and across three different kinds of multilevel systems: *levels of organization*, *levels of representation*, and *levels of integration*.

James (1890) distinguished between human awareness (i.e., the I-self) and the parts and processes (i.e., the Me-self) that inform the so-called sense of identity (i.e., the relation between “I” and “me”). Erikson (1968) showed how the quality of this sense of identity varied systematically with both internal (e.g., ego- and self-identity) and external (e.g., psychosocial identity) contents and processes. There have been many other contributions to our understanding of the experience of being the same person over time and the relation of this experience to a wide range of personal and environmental factors (Roeser, Peck, & Nasir, 2006). Nevertheless, despite the past several hundred years of research and theory about this fundamental aspect of being human, we have yet to reach consensus about some very basic issues. These issues include (a) defining the meaning of the “sense of identity,” (b) specifying the personal and contextual factors involved with this experience, and (c) settling on the terms that are necessary and sufficient for describing it.

Naturally, this lack of consensus has direct consequences for understanding the meaning of the concept of “contextualized identity,” which is both (a) ambiguous until the terms *identity* and *context* are clearly defined and (b) unproductive unless these definitions and terms map on to an integrable body of theory and research. In this article, I will briefly review the nature of the problem (e.g., too much differentiation without integration), describe hierarchical and heterarchical systems theory (i.e., several different kinds of multilevel systems), and discuss how this multilevel framework can be used to understand personality and contextualized identity.

The problem. The terminological proliferation and confusion associated with the concepts of “personality” (e.g., Block, 1995; Emmons, 1995), “self” (e.g., Epstein, 1990; Katzko, 2003), and “identity” (Brubaker & Cooper, 2000; Peck, 2004) have been well documented. In the absence of theoretical integration, we are left

with a gallimaufry of terms in relation to what are presumably a significantly smaller number of underlying parts and processes germane to people's ongoing thinking, feeling, and behaving. In other words, there are things (i.e., contents and processes at multiple levels) and words for things, and distinguishing clearly between them will surely facilitate integrative theory and research related to personality and contextualized identity (Block, 1995; Roeser et al., 2006).

Business as usual. Two of the biggest obstacles to distinguishing between things and terms for things have been referred to as the “jingle and jangle” fallacies (Block, 1995; Roeser et al., 2006). Jingle fallacies occur where two different things are labeled with the same term, and jangle fallacies occur where the same thing is labeled with two different terms. For example, Block (1995) argued that “the Big Five factors, as they have evolved and become differently understood while remaining similarly labeled by different Big Fivers, represent striking instances of the jingle fallacy” (p. 209); and “the jangle fallacy also abounds and is exemplified when the NEO five global dimensions are put forward without recognition of the earlier or alternative, differently named personality constructs to which they are intrinsically linked or which they blend and confound” (p. 210).

Jingle fallacies can inhibit understanding of multilevel systems by promoting *unitary fallacies*—that is, treating things occurring at different levels of a multilevel system as if they exist and function at a single level. For example, treating conscious thoughts (e.g., “I must leave for work right now”), beliefs stored in long-term memory (e.g., work pays the bills), and typical behaviors (e.g., going to work on a daily basis) as if they are different kinds of things existing at the same level (e.g., three different kinds of cells)—as opposed to different kinds of things that are different because they exist at different levels (e.g., atoms, molecules, and cells)—is a unitary fallacy. Avoiding unitary fallacies such as treating thoughts, beliefs, and behaviors as if they exist only on a single level of a unidimensional levels system requires a multilevel systems framework that clearly distinguishes among several different kinds of multilevel systems.

The paucity of well-developed multilevel theories in psychology appears to be related to several factors. For example, according to Staats (2005), we face more complexity than other disciplines yet

devote far less attention to the theoretical work necessary for addressing this complexity. This lack of attention to theoretical integration has resulted in a peculiar brand of “normal” science typified by fragmented theoretical and disciplinary perspectives (Katzko, 2002) as well as preoccupations with specialization and “mini” theories (Staats, 2005), variable-centered methods (Magnusson & Stattin, 1998), and disciplinary prestige (Rychlack, 2005).

Alternatives to business as usual. There have been lots of interesting concepts developed within the general systems theory framework (e.g., self-organization, nonlinear dynamics, emergence), and their promise for advancing psychological science appears to be great (Barton, 1994; Bertalanffy, 1968; Sameroff, 1983). However, most of these concepts appear to be dry formalisms in relation to research questions and data that receive the most attention, and they are seldom used to integrate theory and research from diverse areas of specialization. One of the goals of this article is to help close this gap by showing that taking a rigorous approach to what constitutes a level and a multilevel system has direct implications for defining and understanding concepts such as personality and contextualized identity.

Multilevel systems. Many investigators have used the levels concept to organize ideas and data related to various parts and processes associated with the person-in-context system (e.g., Anderson, 1998; Bryk & Raudenbush, 1992; Cacioppo & Bernstein, 1992; Campbell, 1990; Eccles et al., 1993; Epstein, 1990; James, 1890; Magnusson & Stattin, 1998; Wakefield, 1989). Some of these multilevel models have been formulated more or less explicitly in terms of hierarchical levels (e.g., Allport, 1961; Henriques, 2003; McAdams, 1995; Sheldon, 2004; Wood & Roberts, 2006), but there has been very little discussion about what constitutes a level and, especially, how specific units of analysis vary systematically within and across levels. For example, how are we to distinguish among, or interrelate, concepts such as “levels of explanation” (Wakefield, 1989), “levels of analysis” (Cacioppo & Bernstein, 1992), “levels of organization” (Campbell, 1990), “levels of representation” (Schneirla, 1949), and “levels of integration” (Grene, 1988)? Are these all the same thing? And, if not, how are they different?

There are few examples of how such presumed multilevel systems might cohere into a unified set of multilevel systems, and those that

appear to represent such a unified system (e.g., Henriques, 2003; Sheldon, 2004) typically fall prey to a special form of the unitary fallacy, that is, assuming that a proposed system of levels conforms to a single, unidimensional system of levels. Closer inspection often reveals that this unitary vision oversimplifies a more complex reality. For example, Sheldon (2004) proposed the following “levels of analysis,” characterized as “a hierarchy of possible causes of human behavior” (p. 2): culture, social interaction, personality, cognition, brain/nervous system, organ tissues, cells, molecules, atoms. This kind of levels-of-analysis approach may do more to obscure than clarify because it conflates at least three very different kinds of multilevel systems (described below) by assuming a unidimensional system.

Sheldon appeared to acknowledge this possibility when describing the following “different levels of analysis within personality” (p. 21) as “a hierarchy *within* a hierarchy” (p. 21): self/life-story, motives/goals/intentions, traits/individual differences, and universal characteristics. However, there is a jingle fallacy involved with using the concept of “self-beliefs” in relation to the personality levels and “expectancies and goals” in relation to the cognition level because self-beliefs, expectancies, and goals are simply different kinds of beliefs and belief systems (Peck, 2005). Although this kind of jingle fallacy reflects internal inconsistencies within the theory, I do not intend my critique to obscure the integrative potential implicit in this and similar schemes. Defining personality in relation to (a) the more extensive system of systems in which it is embedded as well as (b) the extensive system of systems of which it is composed is critically important for understanding dynamic relations within and between persons and environments. However, achieving internally consistent theoretical systems will be hastened by attending simultaneously to several different kinds of multilevel systems.

TEMPORAL MULTILEVEL PERSON-ENVIRONMENT SYSTEMS THEORY (TEMPEST)

Temporal Multilevel Person-Environment Systems Theory (TEMPEST) uses concepts and principles from the hierarchical systems theory literature (e.g., Campbell, 1990; Holland, 1995; Pattee, 1973a, 1973b; Salthe, 1985, 1993; Simon, 1996) to define and distinguish

among four different kinds of multilevel systems: levels of organization, levels of representation, levels of integration, and levels of description. Each of these multilevel systems has unique properties, and these unique properties have direct implications for defining both levels and level-specific units of analysis and, hence, for understanding and modeling person-in-context systems (e.g., contextualized identity).

Levels of Organization

The first systematic move from thinking in terms of a single unidimensional levels system to two or more different kinds of levels systems has been discussed in the hierarchical systems theory literature in terms of both (a) “structural” versus “descriptive” hierarchies (Pattee, 1973a) and (b) “scalar” versus “specification” hierarchies (Salthe, 1985, 1993). Pattee’s structural hierarchy and Salthe’s scalar hierarchy refer to levels of organization that can be understood as materially nested parts and processes ranging from the subatomic to the astrophysical. Each level of organization contains similar elements that differ qualitatively from the elements at both higher and lower levels (Salthe, 1985). The parts and processes that form each level of organization are referred to as “materially nested” because parts and processes at the immediately adjacent and “lower” level (e.g., organs) constitute wholes at the next highest level (e.g., organisms); these wholes, in turn, are themselves parts in process that constitute larger wholes at a higher level (e.g., groups).

Levels of organization constitute a synchronic multilevel system in the sense that all the levels exist at the same time and can be described in relation to each other at any given point in time. For example, cells (and their functions) are nested within organs, organs (and their functions) are nested within organisms, and these nested relations hold at every moment in geophysical time. Comparing across different levels of organization reveals a diverse range of “timescales” (Pattee, 1973b), or “cogent moments” (Salthe, 1993). For example, if we consider a moment in our normally experienced time (i.e., the “cogent moment” of a human organism), we see that many things happen during this moment at lower levels (e.g., atomic) and practically nothing happens during this moment at higher levels (e.g., astrophysical). In other words, interactions among parts (i.e., processes) at a given level of organization occur at different speeds

relative to processes at other levels. Consequently, “there is a real break, or boundary, in the world at every jump *across* a level [of organization]” (Salthe, 1985, p. 122).

Simon (1996) described this relation between levels of organization as the “near decomposability” of levels and observed that “intra-component linkages are generally stronger than inter-component linkages” (p. 204). This means, for example, that parts and processes at a given level of organization (e.g., organism) tend to interact weakly with those at adjacent levels (e.g., organs or groups) and not at all with those on nonadjacent levels (e.g., cells or nations). This type of constraint on interactions across levels of organization is referred to as the principle of “nontransitivity of effects across levels” (Salthe, 1993, p. 45); that is, effects flowing across levels of organization generally do not “skip over” levels but “travel through” adjacent levels. For example, the effects of cells on organismic functions (e.g., behavior) are generally fully mediated by organs and their functions.

Levels of Description

In contrast to structural hierarchies (e.g., levels of organization), descriptive hierarchies correspond to the categorization (e.g., classes and subclasses) of part-processes presumed to involve distinct realms of being (cf. Pattee, 1973a; Salthe, 1985). For example, a person can be described simultaneously as study participant, student, American citizen, female, and human. These descriptions are conceptual classes that vary by degrees of abstraction and imply no material differences in the object of description (e.g., the person). In other words, levels of description refer to different ways of classifying or labeling the same object.

The distinction between levels of organization and levels of description corresponds closely to the distinction between “things” and “terms” for things or, more specifically, the distinction between objects of scientific study (e.g., behavior) and the disciplinary terms used to describe those objects (e.g., trait labels). For example, we can observe a series of behaviors (e.g., talkative, friendly, busy) and classify them as extraverted behaviors. If a person behaves regularly in ways we classify as extraverted, we typically describe this person as being extraverted, or having the trait of Extraversion. However, if we then conclude that this trait is formed or composed of the series

of observed behaviors, we imply a material aggregation of things (i.e., traits being composed of behaviors) where there exists only a conceptual (or statistical) aggregation of things (i.e., a series of behaviors we describe with the term *trait*).

Similarly, ordering behaviors and classes of behaviors along a unidimensional continuum of generality ranging from “narrow” to “broad” (e.g., Roberts & Pomerantz, 2004), and describing them as hierarchically related, implies that behaviors (as things) and classes of behavior (as trait terms for things) belong to the same unidimensional multilevel system. However, describing behaviors and classes of behaviors as hierarchically nested within a single multilevel system conflates levels of organization (in which we find behaviors) with levels of description (in which we find trait labels applied to classes of behaviors). We can better avoid such problems by (a) distinguishing between levels of description and levels of organization and (b) further defining person-in-context systems by reference to two additional multilevel systems.

Levels of Representation

Rather than defining person-in-context systems solely in terms of a unidimensional series of levels of organization, TEMPEST includes two additional multilevel systems (see Figure 1): levels of representation that correspond to evolutionary history and levels of integration that correspond to developmental history (cf. Grene, 1988; Piaget, 1954; Schneirla, 1949; Wapner & Demick, 1990; Werner, 1957). These are not levels of abstraction (or levels of descriptive generality); they are material components of person-in-context systems that branch out from multiple levels of organization (i.e., each level of representation is composed of parts and processes existing on several levels of organization). For example, in relation to the molecules, cells, and organs (i.e., levels of organization) constituting an organism, levels of personal representation refer to different areas of the evolved brain that each (a) are composed of the same levels of organization yet (b) process and store information in qualitatively different ways.

The qualitative differences between levels of representation can be generally described in terms of the unique information storage and processing capacities achieved by reptiles, mammals, primates, and humans (cf. Bronson, 1965; Derryberry & Tucker, 1991; Herrick, 1949; MacLean, 1990; Schneirla, 1949). In the modern human brain,

		Levels of Integration			
Levels of Organization	Levels of Representation	a	b	c	d
Person: α	Phenom: I	I am	I am well	I like my place in society	I have come a long way as a citizen
	Symbolic: II	beliefs	attitudes	goals	plans
	Iconic: III	sensory-affective schema	sensory-affective-motor schema	sensory-affective-motor schemas	script
----- Body ~ Behavior					
Context: β	Micro: I	Parent expects Y to do homework	P expects Y to clean room, do homework	P expects Y to clean room, do homework, and wash car	P expects Y to clean room, do homework, wash car and mow lawn
	Meso: II	Principle expects Y to attend class	Principle expects Y to attend class, and do course work	Principle expects Y to attend class, do work, and respect others	Principle expects Y to attend class, work, respect, and graduate
	Macro: III	State expects Y to attend school	State expects Y to attend school and obey curfew laws	State expects Y to attend school, obey curfew and traffic laws	State expects Y to attend school, obey traffic, curfew, & tax laws

Figure 1

Three distinct but interrelated multilevel systems: Levels of Organization, Levels of Representation, and Levels of Integration. Each cell refers to a particular form of structured content and therefore implies a specific conceptual definition of a personality-, self-, or identity-related construct.

Note: Phenom = Phenomenological; Micro = Microsystems; Meso = Mesosystem; Macro = Macrosystem; P = Parent; Y = Youth.

the levels of representation associated with these four phyletic achievements (a) correspond roughly to the brain stem, limbic system, cortex, and prefrontal cortex and (b) exist and operate simultaneously to influence thought, feeling, and behavior. In TEMPEST, these four brain regions are referred to as the *temperamental*, *iconic*, *symbolic*, and *phenomenological* levels of representation and can be viewed as the species-typical basis for the development of the sense of identity.

Levels of Integration

Within each level of representation, there are units of information that differentiate and integrate across developmental time to form multiple levels of integration (cf. Schneirla, 1957). For example,

within the symbolic level of representation, beliefs are the most fundamental unit of information, and basic beliefs differentiate and integrate across time to form more complex belief systems such as attitudes that combine to form goals that combine to form plans. Within the iconic level, schemas are the most fundamental unit of information, and simple sensory-affective and affective-motor schemas combine to form more complex sensory-affective-motor schemas, which combine to form more complex sensory-affective-motor scripts. Although there are important differences between TEMPEST and traditional views of what constitutes a separate level of integration (see below), the basic developmental process of differentiating and integrating simple units of information to form higher levels of integration has been described in detail elsewhere (e.g., Case, 1991; Fischer, 1980; Piaget, 1954; Werner, 1957).

Although personal levels of representation are synchronic (relative to the human observer) because they change on the order of evolutionary time—and levels of integration are diachronic because they change on the order of development time—there are nevertheless important timescale differences between integrative processes occurring at different levels of representation. Similar to the cogent-moment differences characterizing different levels of organization, the rates of developmental differentiation and integration of units within different personal levels of representation can be viewed in terms of a stability hierarchy such that units at the “bottom” (i.e., temperamental) remain relatively stable across the lifespan while those at the “top” (i.e., phenomenological) tend to change on a moment-by-moment basis.

Levels of Representation and Integration as Functionally Nested Heterarchical Systems

In contrast to the materially nested levels of hierarchical organization, levels of representation and integration are best understood as functionally nested heterarchical systems. Functionally nested systems have been described in terms of “control hierarchies” (Pattee, 1973b, p. 75) or “command hierarchies” (e.g., Salthe, 1993, p. 45). For example, although troops are not materially nested within generals, the commands of generals pass down to the troops by “traveling” through intermediary ranks. In TEMPEST, personal levels of representation are viewed as functionally nested because parts and

processes within one level can control parts and processes within another level. For example, the activation of a sensory-affective-motor schema such as “avoid angry father” can “automatically” trigger the activation of plans such as “if he pulls up front, run out the back door; if he uses the garage, run out the front door.”

In contrast to the nontransitive (i.e., through adjacent levels) relations characterizing the materially nested levels of organization, the functional interrelations among levels of representation and integration are viewed as heterarchical because the “command” flow between levels can run directly (i.e., transitively) from any level to any other level (Salthe, 1985). For example, activation of the “avoid angry father” schema (at the iconic level) can simultaneously affect the activation of escape plans (at the symbolic level) and thoughts such as “it better work this time” (at the phenomenological level). In this sense, levels of representation and integration can be viewed as complex adaptive systems exhibiting network dynamics characteristic of parallel distributed processing systems (Holland, 1995).

TEMPEST Summary

TEMPEST claims that at least three distinct multilevel systems are required to describe accurately person-in-context systems: levels of organization, levels of representation, and levels of integration. For example, levels of organization indicate that persons are materially nested within immediate contexts such that (a) there is tangible boundary between the two adjacent and nearly decomposable levels called “person” (i.e., the human organism) and “context” (i.e., the physically proximal environment), (b) the interactions between persons and contexts occur weakly relative to their internal dynamics, and (c) person-context interactions are constrained by the principle of nontransitivity (e.g., the effects of beliefs on social contexts are transmitted through organism-level behavior).

These apparently obvious “facts” are important to establish because they highlight features of contextualized identity that differ significantly from the features highlighted by levels of representation. Whereas levels of organization highlight the distinction between persons and contexts, levels of representation and integration highlight the intricate details within these personal and social levels of organization. These details include the apparently less obvious “facts” that (a) levels of representation are different in kind than

levels of organization, (b) interactions across levels of representation occur transitively, as parallel distributed processes, and (c) the effects of context on behavior are fully mediated by these parallel distributed processes. These latter “facts” highlight the extent to which TEMPEST is useful for addressing the enduring scientific challenge to understand better both the so-called black box (i.e., the “O” in stimulus-organism-response [S-O-R] models) as well as the external environment in which this “O” is embedded. However, using TEMPEST to define and understand something as complex as contextualized identity requires first examining more thoroughly the parts and processes constituting levels of representation and integration.

Applying TEMPEST to Contextualized Identity

Identity theorists often take a narrow view of what constitutes identity (e.g., sense of identity, social identity, narratives). However, a much wider view is necessary to appreciate the full complexity of contextualized identity and its relation to self and personality. Roeser et al. (2006) considered a wide range of identity definitions from the psychological and sociological literatures and showed how these definitions can be organized with respect to different levels of organization and representation. For example, social identities (a) exist within contextual levels of organization and (b) are assigned or afforded to individuals who (c) may or may not internalize them within personal levels of organization in the form of personal identities. Further, personal identities (a) may or may not correspond closely to what was socially assigned or afforded and (b) are stored and processed differently at different levels of representation. For example, if a teacher assigns a “dumb jock” identity to a student, the student might accept this label and associated meanings and disengage from a complex task (that by the assigned “dumb jock” definition is beyond her capacity), or she might reject this label and persevere on this complex task (cf. Steele’s [1997] work on “stereotype threat”).

The TEMPEST description, prediction, and explanation of this contextualized identity scenario would focus on the relation between (a) the “dumb jock” assignment (as environmental stimulus) and (b) temperamental factors such as current levels of energetic and tense arousal, iconic and symbolic information related to this assignment, phenomenologically activated content, and the focus of

awareness in relation to this activated content. However, making sense of how these parts and processes come together to produce a specific pattern of behavior depends first on understanding more about personal levels of representation and the units of integration within and across these levels that produce such specific patterns of behavior.

Personal levels of representation. In TEMPEST, temperamental representation, centered in the brain stem area, refers to species-typical potentials, thresholds, and cycles of arousal (Buss & Plomin, 1984; Roeser et al., 2006; Thayer, 1989). Iconic representation, centered in the limbic system area, refers to the species-typical capacity for the development of “sensory-affective and affective-motor schemas that become increasingly differentiated and integrated into higher order sensory-affective-motor scripts as a function of direct experience with the immediate environment” (Roeser et al., 2006, p. 402). Symbolic representation, centered in the neocortex, refers to the species-typical capacity for the development of “declarative (e.g., beliefs about things) and procedural (e.g., beliefs about how to do things) knowledge (primarily verbal in nature) that becomes increasingly differentiated . . . and integrated . . . over time” (Roeser et al., 2006, p. 403). Phenomenological representation, centered in the prefrontal cortex, refers to the set of all currently activated temperamental, iconic, and symbolic content.

Phenomenological representation can be further defined by reference to both (a) the subset of activated autobiographical content relating specifically to the subjective experience of the self in relation to past, present, and future times and places (James, 1890) and (b) the distinction between the set of all “activated” contents and the subset of these contents that are within *focal awareness* (i.e., consciousness). Regarding autobiographical content, there is nothing particularly novel about the idea that phenomenological representations of self are central to, or even prerequisites for, the sense of personal identity (defined as *selfsameness*). James provided a detailed explanation of this phenomenon where distinguishing between the “direct feeling of regard for [our] own pure principle of individual existence” (p. 318) and the more specific experience of selfsameness that occurs when the objects of phenomenological representation include past and present images of “me” that are perceived to be identical.

In contrast to this relatively enduring temperamental, iconic, symbolic, and phenomenological content (i.e., Me-self), focal awareness refers to the I-self, reflecting James's (1890) "distinction between thought as such, and what it is 'of' or 'about'" (p. 296). The I-self is thought as such, and phenomenological images of "me" (e.g., the analog-I) constructed from Me-self content are objects of this thought. The I-self as awareness can focus selectively on and manipulate representational content, but confusing it with the analog-I is a unitary fallacy. The analog-I (as phenomenologically represented content) does not consciously sense, appropriate, or choose anything; these are functions of the I-self proper, not the analog-I. The causal force of the analog-I is not based on analog-self-consciousness. All representational content (i.e., the Me-self) has causal force, including the symbolic (e.g., evaluatively charged (dis)beliefs about "me") and iconic (e.g., affectively charged schemas associated with such beliefs) representations that inform any given analog-I (Roeser et al., 2006). Further, treating the analog-I as if it were the entire Me-self constitutes a unitary fallacy because the analog-I, as a phenomenological representation of the Me-self, is but one of many parts of the Me-self.

The concept of phenomenologically activated contents that are not necessarily in focal awareness has been described as the *action hierarchy*, or the input queue to the behavioral response system (cf. Arbib, Érdi, & Szentágothai, 1998; Bond, 2004; Martindale, 1981). According to the TEMPEST model, interactions within and across levels of representation must be serialized to influence behavior usefully; that is, parallel distributed processes involving the activation of temperamental, iconic, symbolic, and phenomenological representations are funneled by the action hierarchy to produce a serial stream of behavior (cf. Allport, 1961; Arbib et al., 1998; Bond, 2004). The contents of the action hierarchy can be influenced by (a) the conscious activation of goals via self-reflection, (b) automated processes associated with basic physical needs (e.g., hunger or thirst), and (c) combinations of the baseline *activation thresholds* associated with relatively enduring representations (e.g., valuing Indian food), proximal contextual factors (driving past an Indian restaurant), and other ongoing intraindividual processes (e.g., mood). The precise nature of the action hierarchy and its capacity to serialize representational content to produce coherent patterns of thinking, feeling, and behavior will become more obvious as the multilevel nature of personality becomes more clearly specified.

Contextual levels of representation. The physical and social environments in which humans develop and function are at least as complicated as the intraindividual parts and processes that have been my primary focus. Similar to personal levels of representation, contextual levels of representation also branch out from several levels of organization. I conceptualize them as both materially and functionally nested social and physical microsystems, mesosystems, and macrosystems (cf. Bronfenbrenner, 1979; Roeser et al., 2006). For example, they can be viewed as materially nested systems of family members, classmates, and friends within an immediate interactional context (i.e., microsystems); neighborhoods, schools, and communities that provide the context for microsystems (i.e., mesosystems); and states, school districts, and nations that provide the context for mesosystems (i.e., macrosystems). However, by focusing on the *psychologically active ingredients* (Shoda, Mischel, & Wright, 1994) of these physical and social systems (e.g., the role expectations, rules, and laws specific to the respective levels) and their transitive interlevel interactions, it becomes obvious that these contextual levels of representation are functionally nested heterarchical systems. For example, Sameroff and Fiese (1990) described the regulatory features of macro, meso, and micro contexts in terms of cultural codes (e.g., laws), family codes (e.g., rules), and individual codes (e.g., parental attunement). Together, these systems constitute the environmental opportunities and constraints (i.e., contexts) that function as catalysts for development and as predicates for experiencing and expressing “contextualized” identity; that is, multilevel physical and social contexts affect persons by

- (a) assigning to individuals various consequential group labels, statuses, roles, and related opportunities; (b) providing appraisals and feedback that position individuals into particular kinds of selves/identities; and (c) affording or constraining pathways to competence, autonomous functioning, and social belonging and thereby patterns of participation and associated selves/identities.

(Roeser et al., 2006, p. 405)

Levels of integration. A central postulate of TEMPEST is that units of information specific to each level of representation (e.g., beliefs at the symbolic level) differentiate and integrate according to level-specific

principles. For example, in contrast to approaches that define higher-level integrations as if they subsume units from all lower levels of representation (Case, 1991; Fischer, 1980; Piaget, 1954), TEMPEST claims that symbolic-level integrative structures are not “made out of” iconic-level integrative structures but actually “sit on top of” this iconic base (just as the neocortex “sits on top of” the limbic system). Consequently, iconic and symbolic integrative structures should develop and function across the life span as separate but interdependent systems (cf. Ayoub, Fischer, & O’Connor, 2003; Mounoud, 1990; Schneirla, 1949). This means, for example, that novel events during adulthood (e.g., receiving unconditional love for the first time) should produce changes in sensory-affective-motor schemas that are at least partially independent of the beliefs people have about these events.

Viewed in this way, concepts such as Allport’s (1961) “selves,” Martindale’s (1981) “subselves,” Snow’s (1994) “aptitude complexes,” Elliot and Thrash’s (2001) “goal complexes, Arbib et al.’s (1998) “schema assemblages,” and even Allport’s (1961) “trait” as “neuropsychic structure” can be defined as functionally interdependent configurations of temperamental, iconic, symbolic, and phenomenological content. In TEMPEST, such configurations are described in terms of heterarchically structured cross-level relations in which level-specific units of integration become functionally connected within and across levels in the service of consciously or nonconsciously “controlling” some higher-level system process such as behavior. For example, frequent episodes of violent behavior toward vulnerable others may be generated by relatively enduring configurations of low baseline levels of arousal, disorganized attachment schemas, and subsets of overly positive (narcissistic) self-beliefs.

From a developmental perspective, this suggests that harsh and inconsistent parenting promotes the development of “disorganized” sensory-affective-motor schemas (e.g., strongly charged avoidance schemas that are loosely integrated with strongly charged approach schemas in relation to the same harsh parent; cf. Ayoub et al., 2003). Given the natural desire to avoid phenomenologically negative (i.e., painful) experiences and approach positive experiences, children with such conflicting schemas are motivated to develop belief systems designed to suppress the activation of negatively charged schemas (which are otherwise free to be activated by anything resembling harsh parenting). In this sense, a properly structured symbolic system can be used to regulate the activity of the iconic system (e.g., by suppressing what

would otherwise be experienced consciously as painful; cf. Ayoub et al., 2003; Showers, Zeigler-Hill, & Limke, 2006). For example, increasingly successful “active dissociation” (between negatively and positively charged schemas) is enabled by increasingly complex belief systems designed to both maintain the (iconic) compartmentalization and suppress the activation of negatively charged schemas (Ayoub et al., 2003). These increasingly complex belief systems develop systematically during childhood and can be described in terms of a series of levels of integrative complexity within the symbolic system (cf. Case, 1991; Fischer, 1980; Piaget, 1954).

There has been very little research designed explicitly to examine different forms of integrative complexity within different levels of representation. The majority of theoretical and empirical approaches to variations in integrative complexity have been based on the implicit assumption that the different levels of representation defined in TEMPEST either do not exist or have no relevance for understanding human behavior. For example, Showers et al. (2006) described integrative complexity in terms of “compartmentalization, complexity, and differential importance” within the “self-concept” (p. 474). However, in TEMPEST, concepts about the self refer only to relatively enduring evaluative beliefs about “me” (i.e., symbolic representations) and not to the more enduring affectively charged schemas (i.e., iconic representations) or to the less enduring conscious thoughts and feelings (i.e., phenomenological representations) that are parts within separate but interdependent multilevel systems.

Further, Showers et al.’s (2006) conceptualization and operationalization of integrative complexity in terms of compartmentalization (i.e., the extent to which positive and negative attributes are restricted to experiences within different contexts) does not clearly distinguish among phenomenological, symbolic, and iconic representations. For example, in the card-sorting task used to measure different degrees of compartmentalization, participants report on what appear to be typical phenomenological experiences they have while in specific contexts, but the investigators make no attempt to distinguish between phenomenological experience and beliefs or between beliefs and schemas. Rather, typical of most psychological research, they appear to commit a unitary fallacy by considering phenomenological, symbolic, and iconic representations as interchangeable concepts referring to “self-aspects” (p. 474) existing on a single level.

Addressing Terminological Diversity

Personal identity. TEMPEST provides a framework for defining the meaning of identity terms by reference to the corresponding levels of organization (α , β), representation (I, II, III), and integration (a, b, c, d) of person-in-context systems (see Figure 1). For example, the sense of personal identity can be defined as α .I.b (assuming by “b” that the object of this thought was of the compound variety described by James, 1890); that is, the sense of personal identity refers to the personal (α) phenomenological experience (α .I) of past and present selves being the same (α .I.b). Alternatively, the sense of personality identity defined as the conscious experience of the “fact” of one’s existence (Erikson, 1968; James, 1890) is indicated by α .I.a (“a” because this type of identity experience does not require both past and present self-images). Similarly, identity defined in terms of an occupational aspiration (e.g., measured as beliefs about a highly valued occupation) is indicated by α .II.c+(where “ α .II” indicate a symbolic representation and “c+” indicates that there is not necessarily a plan for obtaining this occupation).

In TEMPEST, personal identity (in contrast to the “sense of” this identity) is described in terms of the accumulated store of relatively enduring yet continually modifiable temperamental, iconic, symbolic, and phenomenological content that has been more or less differentiated and integrated at any given point during the life span, whether or not this content is immediately accessible to focal awareness. For example, in the α .I.b case, “personal identity” refers not to the “sense of” (i.e., not to the I-self or conscious experience) but to that which is sensed (i.e., activated Me-self content). In TEMPEST, that which is sensed (as in the sense of identity) is the relatively enduring temperamental, iconic, and symbolic content that has been activated and represented phenomenologically. In these terms, contextualized identity refers to the relation between the Me-self (as identity) and the external environment (as the context).

This definition of contextualized identity is based on defining “identity” in terms of the Me-self and “context” in terms of the external environment; that is, contextualized identity is defined as the relation between the person-as-a-whole as subject and the context-as-a-whole as object. I refer to this form of subject-object relation as *Type I* because it reflects the kind of subject-object relations con-

sidered most frequently by the wider social science community. However, in psychology, there is a long tradition of using a different form of subject-object distinction (cf. Erikson, 1968; James, 1890); that is, the person's conscious experience is treated as the subject and the various environmental and psychological factors that inform this experience are treated as the object. For example, personal identity can be defined in terms of autobiographical content that is represented at the phenomenological level (e.g., as the analog-I). If the experience of this analog-I, or phenomenological representation of "me," is taken to be personal identity, then the context for this identity includes all of the relatively enduring representational content that is used to construct this analog-I. This type of phenomenological definition of personal identity alters the meaning of the term contextualized identity by switching from a Type 1 subject-object relation to a Type 2 subject-object relation (cf. Peck, 2004).

Using a Type 2 subject-object distinction means defining the subject in terms of conscious experience (as opposed to the entire set of representational content as in Type 1 case). Defining identity in terms of the Type 2 subject-object relation would mean that contextualized identity changes relatively constantly on a moment-by-moment basis. Although TEMPEST does not use this definition of identity (or contextualized identity), it is not uncommon to encounter such definitions of identity in the literature. Nevertheless, the distinction between Type 1 and Type 2 subject-object relations can be used, for example, to distinguish between automatic and controlled forms of agentic behavior. According to TEMPEST, self-reflective processes involving the I-self and activated symbolic content (e.g., the analog-I) are used to imagine various versions of possible selves within various versions of possible contexts and then to encode new forms of symbolic content in the form of beliefs about (a) what to approach and avoid (i.e., goals) and (b) how to approach and avoid them (i.e., plans). In these terms, rather than defining agency strictly in terms of conscious choice (or "controlled processing"), we can also define agency in terms of the "automatic" activation of consciously but previously formed plans. In other words, because consciously created Me-self content can be automatically activated by specific contextual cues, we can use Type 2 agency to create Me-self elements that will become automatically activated to create Type 1 agency.

Reconciling “traits” and “identities.” TEMPEST can be used to determine the meaning of any term used by investigators who provide sufficient detail about their conceptual and operational definitions. For example, defining “role identities” as “the characteristics attributed to oneself within a social role, such as how one sees oneself as a coworker or a friend” (Wood & Roberts, 2006, p. 781) appears to correspond to α .II.c+(i.e., beliefs about me in relation to a specific attribute and a specific context); and defining “role experience” as “single occurrences of outcomes” (p. 787)—measured with items such as “I frequently think about quitting [the role]” (pp. 787–788)—corresponds to α .I.c+(i.e., the phenomenological representation of relations among an analog-I, a behavior, and a role). However, defining “aggregated role outcomes” as “general thoughts, feelings, and behavioral patterns occurring within . . . the role” (p. 782) means that specific thoughts, feelings, and behaviors have been aggregated conceptually (and statistically) and are therefore not “things” but many instances of things that have been classified using a descriptive system. Similarly, “general identity” defined as “how the person sees oneself in general” (p. 782) seems to indicate α .II.b+(i.e., beliefs about the relation between “me” and a general attribute such as “extraverted”); however, “general identity” measured using ratings of “single-word adjectives” (p. 787) that have been statistically aggregated within socially assigned conceptual categories (e.g., extraversion) corresponds to a descriptive classification of “beliefs about me” that does not necessarily correspond to “beliefs about the relation between ‘me’ and a general attribute such as ‘extraverted.’”

Where defining general identity in terms of symbolic representations, the distinction between specific beliefs and classes of beliefs is not particularly problematic, assuming a fairly representative sampling of attributes within socially assigned categories and an explicit understanding that beliefs so classified may or may not correspond to a particular symbolic representation. However, describing such classes of beliefs alternatively as “traits,” “general dispositions,” and “general identity” is a jangle fallacy signaling the need for more rigorous theoretical integration among disparate research traditions. Using TEMPEST, each specific belief would be defined simply as a belief about the relation between “me” and an attribute (i.e., α .II.b), and the statistical aggregation of such beliefs would be described as an estimate of measurement reliability associated with the socially

assigned category used to generate and aggregate test items (e.g., beliefs about extraversion). In other words, this would be viewed as a measure of beliefs about extraversion not a measure of extraversion as a trait (whether defined as a class of behavior or as a configuration of integrative content across levels of representation).

Finally, rather than describing the Personality and Role Identity Structural Model (PRISM) as a “trait counterpart to [e.g., self-esteem] hierarchies” (p. 782) or as “a hierarchy with multiple levels of varying breadth” (Wood & Roberts, 2006, p. 782), TEMPEST suggests that PRISM would be described best in terms of “hierarchically arranged character representations” (p. 782), especially if all of these “character representations” existed as levels of integration within a single level of representation. For example, if general identity, role identities, aggregated role outcomes, and single occurrences of outcomes could all be defined in terms of symbolic representations, then PRISM could be described in terms of levels of integration within the symbolic level of representation. However, because general and role identities appear to be defined in terms of symbolic representations, and aggregated and single role experiences appear to be defined in terms of phenomenological representations, PRISM may be described better in terms of heterarchically arranged character representations (assuming that general versus specific thoughts refers to something other than a descriptive distinction).

Social identity. In TEMPEST terms, contextually assigned or afforded identities (i.e., they exist at the contextual level of organization within one or more contextual levels of representation) are *social identities*, whereas personal beliefs about these social identities, or about social group affiliations, are *personal identities* (i.e., they exist at the personal level of organization within one or more personal levels of representation). Distinctions between personal and social identity made in terms of the extent to which personal identity content is personally individuating versus related to social group membership identification can be described in terms of personal levels of integration. For example, personal beliefs and belief systems have as their referents both personal and social objects, and these beliefs (and their referents) can be more or less integrated with (or isolated from) each other. In these terms, personal identity content referring to social group membership is not social identity or social

identity content; rather, personal identity content includes beliefs about these context-based (i.e., social) identities.

Contextualized Identity as Dynamic Structured Content

Paraphrasing Allport (1961), contents and processes existing within each level of the person-in-context system “*are something and do something*”; that is, contents (structures) and processes (functions) are inseparable but distinct aspects of every level of the system (Pattee, 1973b; Sameroff, 1983). For example, when dealing with multilevel systems characterized by a diverse range of cogent moments, processes at one level (i.e., dynamic interactions among level-specific content) can function as content on adjacent levels (e.g., the activation of symbolic beliefs systems function phenomenologically as the contents of thought). Consequently, person-in-context models require thinking not in terms of process models or content models but, rather, in terms of *dynamic structured content* models where several structures and processes converge on a given focal level structure or process (e.g., Shoda et al., 2002).

This kind of multilevel complexity can be reduced considerably by defining the focal level of person-in-context models as behavior and proceeding according to Salthe’s (1985) claim that “three adjacent levels should provide for a minimal description of any complex diachronic system” (p. 76). In these terms, a complete person-in-context model of behavior will treat intraindividual units of analysis as *initiating conditions* (or potentialities) and extraindividual units of analysis as *boundary conditions* (or constraints). Further, because personal and contextual levels of representation function as hierarchies, such *triadic systems* can incorporate information from several levels of both the person and the context by using pattern-centered approaches to configuring person and context variables in relation to behavior (cf. Roeser & Peck, 2003; Vansteelandt & Van Mechelen, 1998).

Methodological Implications

One of the benefits of thinking in terms of multilevel systems is that data collection, reduction, and analysis is more likely to reflect a match between theory and method. If we accept that person-in-context systems are multilevel systems, then we should also accept that

traditional forms of variable-centered thinking and analysis are severely limited (Bergman, Magnusson, & El-Khoury, 2003; Holland, 1995; Magnusson & Stattin, 1998; von Eye & Bergman, 2003). One reason for this relates to how we conceptualize variables. For example, conceptual definitions based on concepts such as motivation, emotion, cognition, and traits (which correspond more often to levels of description than to any specific aspect of the levels of organization, representation, or integration described here) tend to be ambiguous with respect to multilevel systems; hence, they tend to be poor guides for the development of operational definitions that are specific to the operating characteristics of multilevel systems. In addition, even assuming that variables are operationally defined in ways that are specific to the operating characteristics of multilevel systems, variable-centered analytic techniques are not necessarily useful for analyzing the relations among these variables. For example, applying traditional measurement models assumes that a person's score on a given variable can be meaningfully interpreted in relation to the scores of other people in the sample; however, this assumption is generally untenable from a multilevel systems perspective (Magnusson & Stattin, 1998; Richter, 1997). In addition, although traditional multilevel (e.g., Bryk & Raudenbush, 1992) and growth curve (e.g., Curran & Bollen, 2001) modeling approaches are sophisticated from a conventional methodological standpoint, they are not necessarily suited for examining multilevel systems, mainly because they are based largely on assumptions of sample homogeneity and the linearity and additivity of "effects" (Holland, 1995; Richter, 1997; von Eye & Bergman, 2003).

Alternative approaches for conceptualizing and constructing measurement and analytic models consistent with multilevel systems theories are currently available and becoming more sophisticated all the time (e.g., Bergman et al., 2003; McArdle, 2001; Magnusson & Stattin, 1998; Muthén, 2001; von Eye & Bergman, 2003). Notwithstanding these developments, and the potential relevance of agent-based and neural network models (cf. Holland, 1995; Shoda et al., 2002), there are many cases where using multilevel systems theory to conceptualize research questions and construct analytic models results in statistical analyses that are far simpler than might be predicted on the basis of the complexity of the questions being addressed (Cairns, 1986). For example, pattern-centered techniques can be used to configure a wide range of level-specific

variables that can then be integrated into fairly simple variable-centered statistical models (Muthén & Muthén, 2000; Roeser & Peck, 2003).

The key to these “simple” approaches is to allow multilevel theory to guide (a) the conceptual and operational definitions of level-specific units of analysis and (b) the application of the appropriate measurement and analytic models. For example, researchers often discard highly correlated variables because they believe they are redundant. Borrowing a thought experiment from Kuhl (2001, personal communication), do you think it would make sense if the airline industry decided to remove altimeters and fuel-level indicators from airplanes because they provided information that was redundant (i.e., highly correlated) with speedometers and odometers? These kinds of problems can be avoided by using well-developed, multilevel, person-in-context theories to determine, for example, which (a) items to factor into relevant scale dimensions (e.g., items specific to one level of representation), (b) scales to profile within which levels (e.g., scales specific to the operating characteristics of the system under study), (c) cross-level configurations to construct (e.g., beliefs by schemas), and (d) temporal flows to model (e.g., Context → Person → Behavior) and not model (e.g., Context → Behavior → Person).

Conclusion

Without attending seriously to conceptual and operational definitions of “context” and “identity” as multilevel systems, the concept of contextualized identity might amplify rather than ameliorate the existing terminological gallimaufry of psychological, biological, and sociological terms. Developing internally consistent theory and data within a paper or research program is a laudable goal, but psychological science will be more significantly advanced by creating such consistency across papers and programs. Achieving this more ambitious goal depends heavily on recognizing both (a) jingle and jangle fallacies and (b) different kinds of multilevel systems.

Applied indiscriminately, the idea of heterarchical multilevel relations can undermine the value of taking a hierarchical systems approach. For example, if we resort to the idea that “everything affects everything” or that “everything is reciprocally related to everything else,” then it will be difficult or impossible to construct internally consistent models of dynamic person-in-context systems that relate

coherently to models developed from alternative perspectives. However, applied carefully (e.g., in conjunction with what we know about hierarchical systems), heterarchical system concepts (e.g., transitive relations) should be integral to building person-in-context models that blend seamlessly the dynamic and mechanistic parallel distributed processes characteristic of intraindividual and social dynamics with the dynamic and mechanistic serial processes characteristic of person-environment transactions.

According to Holland (1995), “hierarchical structures are a pervasive feature of all *cas* [i.e., complex adaptive systems]” (p. 107). In this article, I have attempted to explain what this means for studying and understanding person-in-context systems. According to TEMPEST, the levels of organization hierarchy allows us to place the person-in-context system within the larger system of nature; it instantiates the important relation between persons and contexts as distinct but interconnected units of analysis that are themselves embedded within a much larger array of complex systems. The levels of representation heterarchies highlight our evolutionary history and fundamental distinctions among the diverse ways that information is represented and processed within both persons and contexts. The levels of integration heterarchies allow us to understand how particular units of analysis become differentiated and integrated over time into increasingly complex patterns of level-specific content. These distinctions allow us to map identity (and other) terminology clearly and consistently onto conceptual and operational definitions of person and context variables, thereby making it relatively easy to see how theories and models generated by different investigators working within different disciplinary frameworks do or do not relate to each other. Together, these multilevel systems help us understand, measure, and model the complex nonlinear dynamics that arise from contextualized identity and that result in the processes of thinking, feeling, and behavior.

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