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Chapter 3

Systems Intelligence as a trait: A meta-model for a systemic understanding of personality

John F. Rauthmann

The construct of systems intelligence (SI) by Hämäläinen and Saarinen (2004, 2007, 2008) can be seen as either an ability (Ability-SI) or a trait (Trait-SI). When studying SI as a trait, traditional psychological understanding of "personality", "dispositions", "traits", and "states" might not be sufficient to grasp the dynamic and systemic character that the construct entails. Systems intelligent people exhibit intelligent action within complex and dynamic systems with feedback processes. Therefore, it is necessary to understand structures, processes, and dynamics of situations (contexts), dispositions (traits) and personality, as well as behaviour. Building up on crucial controversies in personality psychology, integrative meta-models for situations and dispositions are presented. Further, the disposition model is transduced into a systemic-synergetic model, and a systemic-synergetic conceptualisation of personality is outlined. The theorisations in this chapter serve to provide a framework for the study of Trait-SI that integrates a structural and process-focused view, and also allows for systemic-synergetic conceptualisations.

Introduction

Although systems intelligence (SI) relates to abilities (e.g., intelligent performance within complex systems), there are also trait-aspects. Analogous to emotional intelligence, we can distinguish ability-, trait-, and mixed-models (Mayer, Roberts, and Barsade, 2008). Trait-SI might be a fruitful area in the study of SI. In conceptualising SI as a trait, however, we should do two things: (a) outline crucial controversies concerning traits to get a picture of trait concepts and some of their problems (which can and have been resolved to a great extent) and (b) propose an integrative model of situations and dispositions which will serve as a meta-theoretical underpinning for trait-based SI concepts which can be also seen in a systemic-synergetical manner.

Crucial debates in personality psychology

There are crucial controversies of personality psychology listed in Table 1. These all do affect how SI is conceptualised as a trait. As can be seen, these controversies are obviously interrelated and taking one position on a rather dichotomous controversy affects also others. For example, if we take the position of "traits" in the state vs. trait controversy, we are very likely to take position for "person" in the person vs. situation controversy, "structure" in the

structure vs. process controversy, and "nomothetic" in the nomothetic vs. idiographic approaches debate. This would then reflect the notion that people can be categorised concerning rather structural and aplastic trait dimensions (enduring cognitive, emotional, motivational, and behavioural characteristics or tendencies) that are believed to be stable over many situations and time (consistency). Even though this sounds plausible, reality is not that simple. These positions are not as dichotomous and incompatible as the may seem at first sight; many psychologists (e.g., Fleeson, 2001, 2004, 2007; Fleeson and Noftle, 2008a, 2008b; Funder, 2006; Mischel and Shoda, 1995) have proposed integrative thoughts on how these controversies can be dissolved and combined into an integrative (and modern) personality psychology.

Especially the person-situation debate was very prominent in personality psychology as it affects the core issue of variant (inconsistent) and invariant (consistent) aspects of us: If only situations determine our actions (thoughts, feelings, desires, intentions, and behaviours), then there is no consistency in how we act – except when situations are very similar to each other. Therefore, we need no traits or personality system generating mental and behavioural patterns as all stability and variability can be explained by external influences. As a result, we would not need any personality psychology. Of course, this is a relatively radical position; it is referred to as situationism. It was especially favoured among social and learning (behaviourist) psychologists and is, philosophically, near to external determinism. Opposed to this view is personism: Traits and personality are existent and meaningful. They are expressed in mental processes and behaviour patterns and are mostly due to internal, innate factors (which reminds of internal determinism).

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The concept of so-called if-then patterns of contexts and thoughts, feelings, and behaviour was a concept to dissolve some problems of the person–situation debate (e.g., Mischel and Shoda, 1995; Wright and Mischel, 1987): if context X, then (re-)action Y. Amelang and colleagues (2006) give the example of glass: glass is potentially breakable (disposition). If it falls (situation), then it breaks (reaction). The disposition "breakable" is only manifested in the reaction "broken" (then-part) under the specific circumstance "(somehow) fell" (if-part). "Fell" would be an abstract functionally homogeneous situation or context class; the glass may fall differently and due to various external reasons but the outcome (being broken after the fall and thus exhibiting the disposition "breakable") will always be (functionally) the same. This view describes dispositions as latent variables that are only manifested under certain circumstances (which is the if-part) and need not be exhibited at all times or in a general fashion. For example, an individual scoring high on neuroticism (emotional instability) does not necessarily have to be all the time more anxious but tends to be more anxious than other people when confronted with threatful stimuli. This means that individuals high in neuroticism "reveal" their disposition (anxiousness) only and/or more intense if the "right" triggering circumstances (threat- or harmful stimuli) are given. The if-then conceptualisation of dispositions strives to integrate situational triggers, which account for behavioural variability, and remarkable intraindividual stability in one's behavioural patterns.

Table 1. Crucial controversies in personality psychology

Controversy	Positions
Trait vs. State	***Trait:*** • stable, long-term, enduring characteristics that describe people in general • mostly seen as (more or less central) person characteristics ***State:*** • unstable, short-term, momentary conditions of people that can also be atypical for them • mostly seen as (more or less random) fluctuations
Person vs. Situation	***Person:*** • exsistence and meaningfulness of traits and personality • behavioural consistency (stability) • dominance of traits in behaviour (internal determinism) ***Situation:*** • non-existence and non-meaningfulness of traits and personality • behavioural inconsistency (instability) • dominance of situations in behaviour (external determinism)
Structure vs. Process	***Structure:*** • traits as descriptive elements or fixed dimensions that are an accumulation of the reliable elements of states or within-person variability • states as capricious or error and thus neglected (or avaraged out) ***Process / Dynamics:*** • traits as dynamic processes that also integrate states and within-person variability over different situations and time • states as part of a dispositional density distribution of a trait dimension (with mean, standard deviation, skewness, and kurtosis)
Nomothetic vs. Idiographic	***Nomothetic:*** • general approach to individuals differing in certain parameters • interindividual viewing point → between-person variability ***Idiographic:*** • person-centred approach to a unique individual • intraindividual viewing point → within-person variability and stability

Psychological dispositions are seen as certain groups of if-then relations which contain contingencies between antecedent situational cues (environmental stimuli) and (triggered)

behaviour forms and mental processes (Amelang et al., 2006, p. 76; see Wright and Mischel, 1987). Intraindividual situation-behaviour[7] relations $s \rightarrow b$ are explained, given a certain situation s_j: Only the group J of $s \rightarrow b$ relations to which s_j is functionally equivalent[8] is relevant. This leads to following formula (see Amelang et al., 2006, p. 76): $b_{ij} = f([s_J \rightarrow b_J], s_j) = f(p_{ij}, s_j)$. A disposition would then be a "relation" or contingency of a situation class (comprising functionally equivalent or subjectively homogeneous and similar situations) and a behaviour class (comprising functionally equivalent but not necessarily morphologically similar behaviour forms) which both together form a certain functional link in their relation.

This model of dispositions uses an intraindividual perspective opposed to the commonly interin-dividual one. Further, the model holds implications for consistencies: An individual will be more likely cross-situationally consistent in its behaviour in a homogeneous situation class (a class of subjectively equivalent or similar situations) while cross-situational consistency should be rather low over heterogeneous situation classes. This fact accounts for low cross-situational consistencies of dispositions and specific behavioural reaction forms (which may still be functionally equivalent, though). Further, there is obvious (situational) plasticity, adaptability, and variability of behaviour as well as inherent stability and coherence (within homogeneous situation classes but not in heterogeneous ones). Even within a situation class the morphology and intensity of behaviours might vary, giving rise to within-person variability and intraindividual differences (see also density distributions by Fleeson, 2001, 2007). However, behaviour forms might still be functionally equivalent or serve a higher goal: for example, an individual high in conscientiousness might have a messy working place but is still very tidy and accurate when it comes to designing and sorting documents. Indeed, the individual has sometimes a really messy desk and at other times the neatest and tidiest one. At first, this may seem as the person cannot be adequately described by a single trait as he or she seems not to follow a certain stable pattern that would denote him or her as "conscientious" or "tidy". However, this conclusion might be mistaken: the person can indeed be conscientious. Although neglecting the desk at certain times (e.g., when having a lot to do, being under stress, etc.), the person is very tidy when it comes to his or her documents and work. To tidy them up, the person apparently does not care about leaving his or her desk messy – the work has simply got to be done (which is a specific goal of the individual and high in subjective value). Yet, when having the time he or she will clean up the desk. Hence, there would also be a certain pattern in the variability of "keeping the desk messy (when a lot to do) vs. tidy (when not much to do)" (or, to put it in words of a if-then conceptualisation: "*if* a lot do, *then* keep desk untidy vs. *if* not much to do, *then* keep desk

[7] "Behaviour" is used here as a subsuming term for actual, manifested behaviour *and* mental processes (see e.g., Fleeson and Noftle, 2008a; Mischel and Shoda, 1995).

[8] Note that the functional equivalence and homogeneity of situations is not so much based on objective situation criteria but rather on subjective ones, the "psychologically active situation characteristics" (Fleeson, 2007). These, in turn, are perceived and constructed by personal and subjective "maps" that function as situation filtering perceptional units (see also Mischel and Shoda, 1995). Situation classes should therefore be in their content and overall effects rather homogeneous: A certain disposition may hence only be displayed within a certain situation class (that is subjectively homogeneous in its contextual features) but not in other situation classes as their situational aspects are not triggering in the subjective perception of an individual.

tidy") but also the long-term tendency of being tidy (as seen in the documents and general working style of the individual). Being messy thus serves the purpose or goal of tidying up the documents under certain circumstances (see also Fleeson and Noftle, 2008b, p. 1361; Bem and Allen, 1974). The individual would still be coherent although manifesting obvious within-person variability. The integration of consistency with intraindividual variability is one of the most fascinating things personality psychology has to offer.

Fleeson and Noftle (2008a) "end" the debate on person vs. situation by concluding that there are multiple types of consistencies (Fleeson and Noftle, 2008b) and that behaviour might be "consistent" for some types, but not for others[9]. Not only should the consistency concepts be applied to the scientific investigation of trait-SI but also the lines of research proposed by the authors seem particularly interesting for future SI research in general.

Even though the previously described trait conceptualisation has its flaws and limitations (which cannot be explicated further here), it would serve as a good basis for conceptualising SI as a trait. All further theorisation of Trait-SI in this work partly relies on notions of process-focused trait concepts but also modifies certain aspects. Therefore, it becomes necessary to also take a closer look at situations since they are intertwined with mental processes and behaviour. To understand Trait-SI, we must understand the properties of *situations* and *behaviours*.

Situations

There are quite different conceptualisations of "situations" or "contexts"[10]: there is dispute on *what they are, how they may be seen, what influences they have, and how they may be categorised*. Even though some social psychologists might tend to operationalise situations merely as certain external, objectively existing stimuli that somehow impose influences on an individual, this is a very narrow definition of a "situation", leading to various problems with traits and consistencies.

- First of all, a situation can consist of several external stimuli but it should not be limited to them. In the study of personality psychology and especially SI it is crucial to emphasise the *subjective aspects of situations*, meaning psychologically active situation characteristics (Fleeson, 2007). Situations are always subjectively perceived by mediating cognitive-affective-motivational units as "situation filters" (see also the conception of cognitive-affective units in a cognitive-affective personality system by Mischel and Shoda, 1995), and the question whether something can at all be perceived objectively by us humans is rather a matter of philosophy. Therefore, it will be fruitful to explore the cognitive-affective interpretations of situations (while not neglecting the objectively existing situation features, though). Moreover, many homogeneous or functionally equivalent situations (or rather their subjectively perceived characteristics) can also be aggregated to situation classes. The important point is that situations need not be

[9] Fleeson and Noftle (2008b) propose a super-matrix of 36 different consistency concepts. Most have not been explored thus far.

[10] The terms "situation" and "context" are used interchangeably here.

objective. Yet, there is still the question which aspects, besides subjective mediating units and schemata, allow us to form certain "situation classes" (and how and why).

- Second, situations are not just external matters but also *internal* ones. Current moods and other cognitive-affective variables serve as a certain "frame" (internal situation or momentary condition) within each external situation occurs. A genuine, truly existing situation, as we humans experience it, is always an interaction of objective external situation variables, subjectively perceived situation variables, and internal situation variables (see Figure 1), although in some instances some variables might be stronger. This complex concatenation makes it difficult for both social and personality psychologists to grasp interaction effects between person(ality), situations, and behaviour (including mental processes). In a systemic-synergetic point of view (e.g., Haken and Schiepek, 2006) it is quite usual to see situations as the function of external *and* internal factors. This notion should also be applied to other fields of psychology. In particular, research in the field of SI will benefit from such a view that integrates different aspects of situations and persons along with their behaviour.

- Third, the *"influences" of ("strong" and "weak") situations* (however they may be defined) are quite difficult to determine. In general, this is a point where social and personality psychologists divide quite strongly, the former claiming that situations influence behaviour (and often denying the existence of traits), the latter claiming that traits influence behaviour (and confirming that traits do exist).

To summarise the preceding points, "situations" are understood in this work in accordance with Mischel and Shoda (1995) not just as external stimuli affecting us (such as early behaviourism posits it); rather, only certain aspects or situational cues that draw our attention affect us. Moreover, the psychological characteristics of a situation seem more important than their objectively existing ones. Also, one must take into account that persons actively construct and generate their own situations, for example "in thought, planning, fantasy, and imagination" (Mischel and Shoda, 1995, p. 251). Situations can thus be social and interpersonal or intrapsychical (e.g., thoughts, moods, states, etc.). Therefore, when we speak about cognitive-affective-motivational tendencies in relation to certain situations, there might only be certain aspects of situations "of interest" to an individual (depending on its learning history, autobiography, mood, current "state", goals, self-concepts, etc.) which trigger cognitive-affective-motivational tendencies. The "psychological situation" is a mixture of objectively existing aspects of a situation and the interpretation or meaning-giving to those aspects through the individual's personal constructs, concepts, and subjective maps (see also Kelly, 1955; Mischel, 1973; Mischel and Shoda, 1995). According to Mischel and Shoda (1995, p. 252), "individuals differ in how they selectively focus on different features of situations, how they categorize and encode them cognitively and emotionally, and how those encodings activate and interact with other cognitions and affects in the personality system."

Also, we ought to take into account the *occuring frequency of situations* because certain situations might be over- or underrepresented in the daily life of a person. People can choose to a certain extent which situations they seek, avoid, bear, modify, or generate. This makes some situations more or less representative and relevant for the cognitive-affective-motivational reactions and behaviour of an individual: a certain latent disposition might be given, but the then-part (actual, observable, overt behaviour) is not activated very often because the if-part (contextual aspects) is quite seldom.

Many of the preceding points pose an important question to trait assessment: *Should we offer contextualised or decontextualised information (item material) when assessing traits?* This question may be best answered by the research purpose and viewing point(s), that is what one wants to measure. Maybe decontextualised material, as often used in nomothetic approaches, accounts best for broad traits (traits with high bandwidth) and tendencies over time (offering better long-term predictive validity), whereas contextualised material will account better for within-person variability in a short spectrum of time (offering better concurrent and short-term predictive validity) for more narrow traits and thus is more of interest for person-centred and more idiographic measures. This should be taken into consideration when constructing scales for Trait-SI. The question will then be how broad or narrow we want to measure SI and which aspects of it.

The consideration of situations and contexts is indeed essential to SI as systems intelligent people perform intelligently *within* systems. The concept of "systems" (as interrelated and interacting elements) implies some sort of surroundings or environment. Thus, SI can hardly be studied without any concepts of "contexts" and how they are related to traits.

Behaviour

The default interpretation of "behaviour" is that of a classical behaviourist: a behaviour is any overt and externally observable movement that can be objectively measured by certain devices. In the following, this limited view of behaviour will be expanded by some other aspects that should also be considered as "behaviour".

- First, *behaviour need not be observed nor (objectively) measured* and may still occur (this is, however, a rather philosophical question and shall not be discussed further here). Also, one could discuss the *extent to which a certain behaviour can be objectively measured and by which methods this can be achieved* (which is a methodological problem that we cannot delve into here).

- Second, there is *uncertainty as to which levels of behaviour* to approach, which levels there are (e.g., molecular vs. molar), if it makes at all sense to distinguish different levels, which implications different levels of behaviour bear, and how they may be manifested.

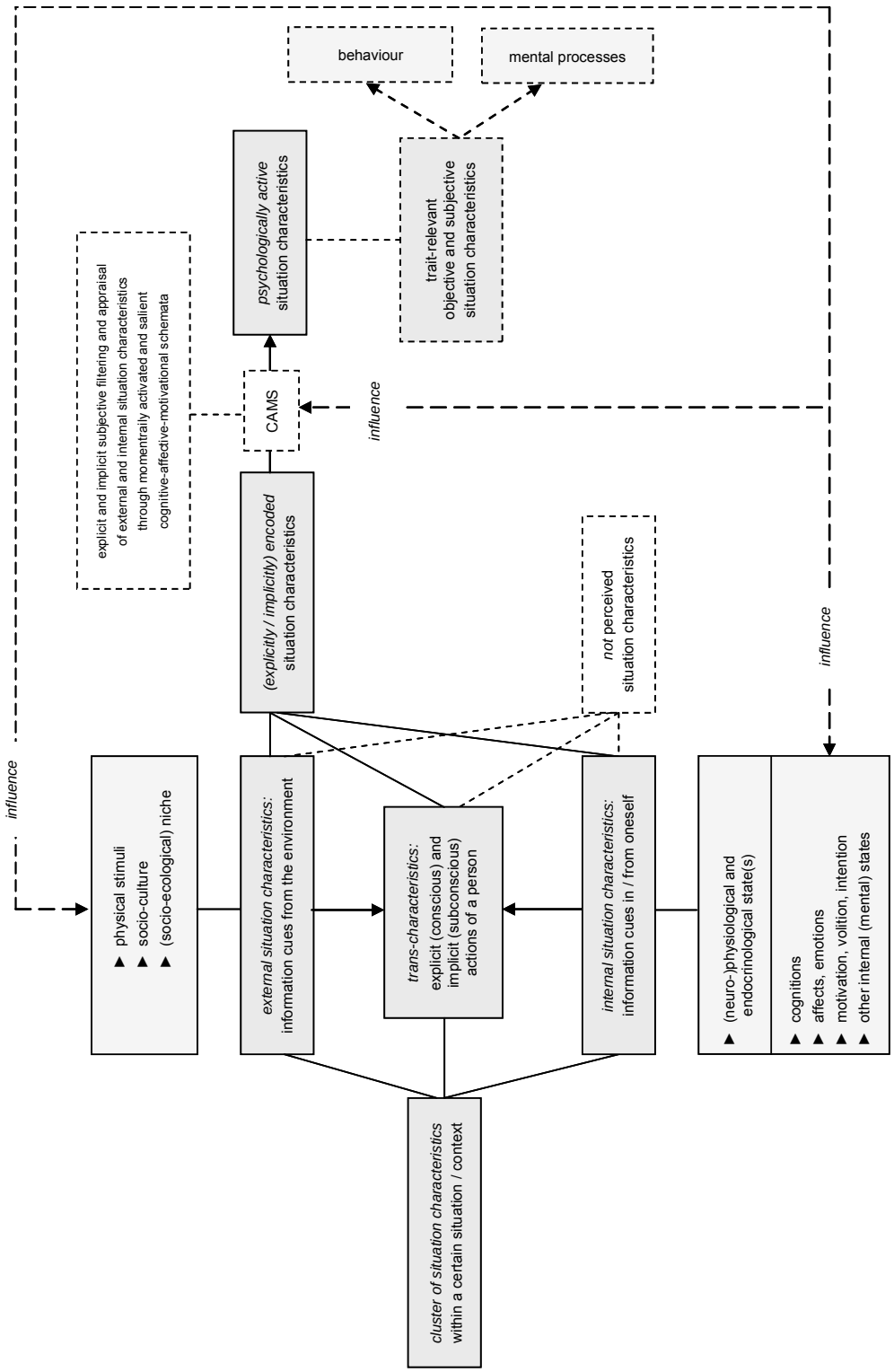

Figure 1. A process-focused situation model

- Third, the *conceptualisation of "behaviour"* is a vital point. Is any externally observable movement a behaviour? Yes, it is. Yet, this definition disregards another aspect of behaviour that cannot be separated from it as easily we would sometimes wish: *mental processes*. Not only the systems psychological position (e.g., Haken and Schiepek, 2006; Strunk and Schiepek, 2006) but also other psychologists (see, for instance, Fleeson and Noftle, 2008a, 2008b; Mischel and Shoda, 1995) explicitly use the term "behaviour" in the sense of behaviour *and* mental processes. This is a broader view on "behaviour" and comes far more nearer to the "real" phenomenon than the default behaviourist definition (although it complicates things). Though many might agree on conceptualising "behaviour" as seen above, there is great divergence on the rather problematic aspects of this conceptualisation: *how are behaviour and mental processes interrelated? Can we presume causal priority for one of the dimensions?* Without delving too deep in this complex problem, we should take to notice that in most cases it will not be sensible to ask what came first (as with asking if the hen or the egg came first) because there is a dynamic flow of person-situation inter-/transaction. In special cases it might be sensible, though. Mental processes and behaviour are interrelated in a dynamic and interactionist way and may seldom be separated from each other without omitting important aspects of one another.

- Fourth, the *"channels" of behaviour* must be distinguished as they may vary and pose *morphological differences in behaviour (enactment) but not in functional ways* (e.g., expressing aggression by kicking, hitting, biting, spitting, insulting, etc.). Rather, *functional (dis)similarities* of behaviour can be important.

- Fifth, the *"relationship" between behaviour and situation (or stimuli of situations)* should be investigated closely. Some psychologists see in the (functional) linkage of behaviour and situation the chance to infer (underlying) mental processes and/or relatively stable characteristics (traits) should these situation-behaviour patterns occur more often and be intraindividually stable. Mischel and Shoda (1995) term these "linkages" or contingencies *if-then patterns*: *if* situation X, *then* behaviour Y. This sentence can be extended to a more complex formulation (taking into account the preceding remarks on situations and behaviour): *IF the in subjective (and objective) situation content homogeneous / functionally similar context class X (which is perceived by mediating cognitive-affective-motivational schemata), THEN the in content and morphology differing and variable but yet functionally similar and equivalent action class Y (consisting of behaviour and involved mental processes)*[11].

[11] Note that this is not meant as a behaviourist term in the sense that "if stimulus X, then response Y" but that these two dimensions, that is the "if" (context) and the "then" (mental processes, behaviour), are somehow associated and occur together which, on the other hand, does not exclude contexts triggering mental processes and behaviour (and even vice versa!).

Closely associated to this is that situations may not just "cause", "influence", or "affect" us but that we can (a) imagine, construct, and generate certain situations ourselves (which may be labeled as "internal situations"), and (b) remain, seek, avoid, modify, and generate external circumstances or situations. The last part is concerned with *passive, reactive, evocative, active, and proactive acting* which may be seen as the (functional) "quality" of the if-then patterns. To illustrate this: The if-then pattern "making experiences with people" (people: if- or situational part; making experiences: then- or behavioural part) can imply different linkage qualities of the abstract behaviour class "making experiences" (which encompasses several different forms of making experiences that need not be morphologically equivalent but are all functionally equivalent in terms of serving the same goal of gaining experience with something or someone) and the abstract context class "people" (subsuming any kind of "people" and being on a considerably high abstraction level). One can passively make experiences with people by just sitting in a room such as the doctor's waiting room with other people; however, this would most likely not be seen as a specific (interpersonal, interactional) experience with people. A teacher can reactively make experiences with people when a crowd of pupils bursts suddenly into his or her room and he or she has to react to their wishes and needs. Evocative experiencing with people would emphasise the aspect of bringing forth certain reactions of others (e.g., when flirting). Active and also proactive experiencing with people would be really going out and seeking people to actively make experiences with them.

Different levels of behaviour

Roughly, *micro-, meso-,* and *macro-behaviour* as well as *implicit* and *explicit behaviour* can be distinguished (see Figure 2).

Micro-behaviour refers to mostly implicit behaviour on a "molecular" level of behaviour which is particularly reactive, automatic, rapid (i.e., rapidly occurring), and barely noticeable (e.g., eye movements, muscle twitches, sweaty hands, etc.). This micro-form of behaviour is seldom consciously used as the (attentional and intentional) access to such molecular levels is either slim, completely denied, or just not very often used. Even the observer tends to not put conscious attention on micro-behaviour as it is processed implicitly (if at all). Micro-behaviour is closely related to physiological variables, which implies that it can be best measured by objective (physiological) tests (T-data). Q-data cannot be obtained from this level of behaviour (one cannot ask a person how his or her eye movements will be when seeing a certain picture); L-data, in the sense of behavioural data (B-data), may be very difficult to obtain as the observers would have to be trained in recognising and (correctly) analysing micro-behaviour forms. Furthermore, most micro-behaviours are universal and general in the sense that there should be only slight inter(-socio-)cultural differences and that they are largely genetically (and temperamentally) determined.

Meso-behaviour basically refers to a wide range of verbal and averbal (para-, non-, extra-verbal) channels of behaviour. These can be used willfully (i.e., consciously or explicitly) but are mostly exhibited in a more implicit fashion (e.g., by gestics, posture, etc.). Meso-behaviour occurs for verbal output most of the time explicitly and for its

averbal output rather implicitly. However, when laying attention upon one's (re-)actions, one can moderate, control, or generate certain cues of meso-behaviour. This level of behaviour can be recognised by the exhibitor at will and can be perceived by others at all times (if they pay attention). It is also accessible to reflection: One can think about his or her own words and body language (but it is a prerequisite that one starts thinking about it and puts attention to it). From meso-behaviour, we may thus obtain Q-data und L-data. T-data could also be obtained if it does not focus on the micro-behaviour associated with the meso-behaviour (such as muscle movements while exhibiting a phoney smile) but rather on objective measurement of meso-level behaviour. Moreover, meso-behaviour is heavily affected by socio-cultural determinants.

Macro-behaviour, as a more abstract form of behaviour, represents all (re-)actions that somehow concern "doing" (in the broadest sense) something with a "situation" (in the broadest sense), for instance, when a person seeks, avoids, modifies, (mentally) construes and/or generates certain situations. This class would therefore not really fit into the meso-class as meso-level behaviour forms may only be the (instrumental) basis for altering a situation or constituting it. For example, when emigrating to Canada, working and starting a family there (i.e., arranging and building one's own environment and life), this would be macro-behaviour that consists of "conjunctions" of many various meso-level behaviour forms adding up to a bigger whole[12]. Macro-behaviour usually refers to more explicit actions than implicit ones and involves a great deal of cognition, emotion, and motivation as well as volition, intention and regulation. Quite seldom macro-behaviour can be explored without socio-cultural context factors (e.g., display rules for affect) and meso-level behaviour forms. Micro-behaviour forms usually play no significant role in macro-behaviour. Q-data and L-data may be obtained best when dealing with macro-behaviour (e.g., narrative methods). B-data from friends, peers, relatives, significant others, etc. can also bring interesting aspects into light. T-data is not very appropriate here. The macro-behaviour level could be of most interest when studying systems intelligent acting in everyday life.

It is important to note that micro-, meso-, and macro-behaviour as well as its implicit and explicit forms usually occur simultaneously and are not distinguished as three separate forms of behaviour: There is a continuum from micro to meso to macro. This continuum particularly makes it difficult to assess the level of behaviour that is of interest.

Yet, all these behaviour forms have in common that they constitute a certain "link" between the individual and the environment. This link has certain qualities which may be described as the *"functional quality of behaviour"*: behaviour can be *passive, reactive, evocative, active,* and *proactive*. In the stream of behaviour with dynamic interactions and fluctuations of different levels of behaviour, there can be multiple functional behaviour qualities at once. For example, when flirting with someone, one is reactive on the micro-level (the feedback through mimics and oculesics of the other person cause own mimic reactions that may not be conscious and are not willingly expressed, such as smiling back),

[12] This may also hold true for SI: Although SI-related behaviours may occur on the meso-level, the effects of SI manifest on a macro-level and can be studied there.

active on the meso-level (intentionally making and holding eye-contact with the other person, smiling more), and evocative on the macro-level ("sexifying" the situation with various flirt-signals and leading to interest from the other person). Even though each level could potentially constitute all five links, there seem to be certain affinities: Micro-level behaviours tend to be more reactive and at best evocative (only if other people recognise the behaviour, though, and react to it themselves). Meso-level behaviour can be reactive, evocative, active, and/or proactive. Macro-level behaviour can be all five but tends to be evocative and/or (pro-)active (see also Figure 2).

A Disposition Model for Systems Intelligence Integrating Structures and Processes

If we want to conceptualise SI as a trait or disposition, an integration of process- and structure-focused disposition models instead of merely structure-based ones should be considered. In the following, an integrative disposition model (see Figure 3) as a meta-model that aims at unifying the different controversies and especially integrating the view of structure- and process-focused trait concepts is described. The model can be used as a meta-model that depicts dispositional structures as well as processes and dynamics in general. This model can be greatly applied to systems intellect – the Trait-SI. The previous remarks on situations and behaviours serve as a basis for this meta-model.

The highly complex, multifaceted, and dynamic "personality system" is conceptualised as a latent, mental as well as behavioural (re-)actions generating, and heterogeneous macro-variable that represents a "reservoir" of different structures and processes: There are certain information processing modes that can be triggered (e.g., cognition, affect or emotion, motivation, etc.) and chronified structures (obtained, for example, through one's learning history and autobiography, stable environment, genome, etc.) such as self-related variables (e.g., social and non-social schemata, scripts, self-concepts, social roles, identity or identities, etc.). Certain chronified structures can be triggered or activated by environmental stimuli and then represent momentarily activated and salient cognitive-affective-motivational schemata (CAMS) which in turn "filter" the objective situation characteristics. These CAMS generate through subjective perception mechanisms psychologically active situation characteristics which need not be equivalent with the objectively triggering ones. CAMS are actually constantly activated as long as we are awake but their content and filter mechanisms vary in relation to the contexts (internal *and* external ones) we are in. The subjectively filtered, psychologically active situation aspects are then processed within the personality system. Depending on the "state" of the system and the incoming situational information, different modes of information processing occur. Also, different other chronified structures can be activated and add to the momentarily occurring processing (e.g., activated memories, needs, desires, etc.). In this state, certain structures are salient (which, in turn, might contribute to the situation filtering) and different processes with these structures are established. There are intrapsychic (i.e., psychic, mental) processes (cognition, emotion, motivation, volition, etc.) and extrapsychic (behavioural) dynamics that emerge. The intrapsychic ones stem directly from the information processing processes and can contribute to subjective perception mechanisms of the CAMS by adding new

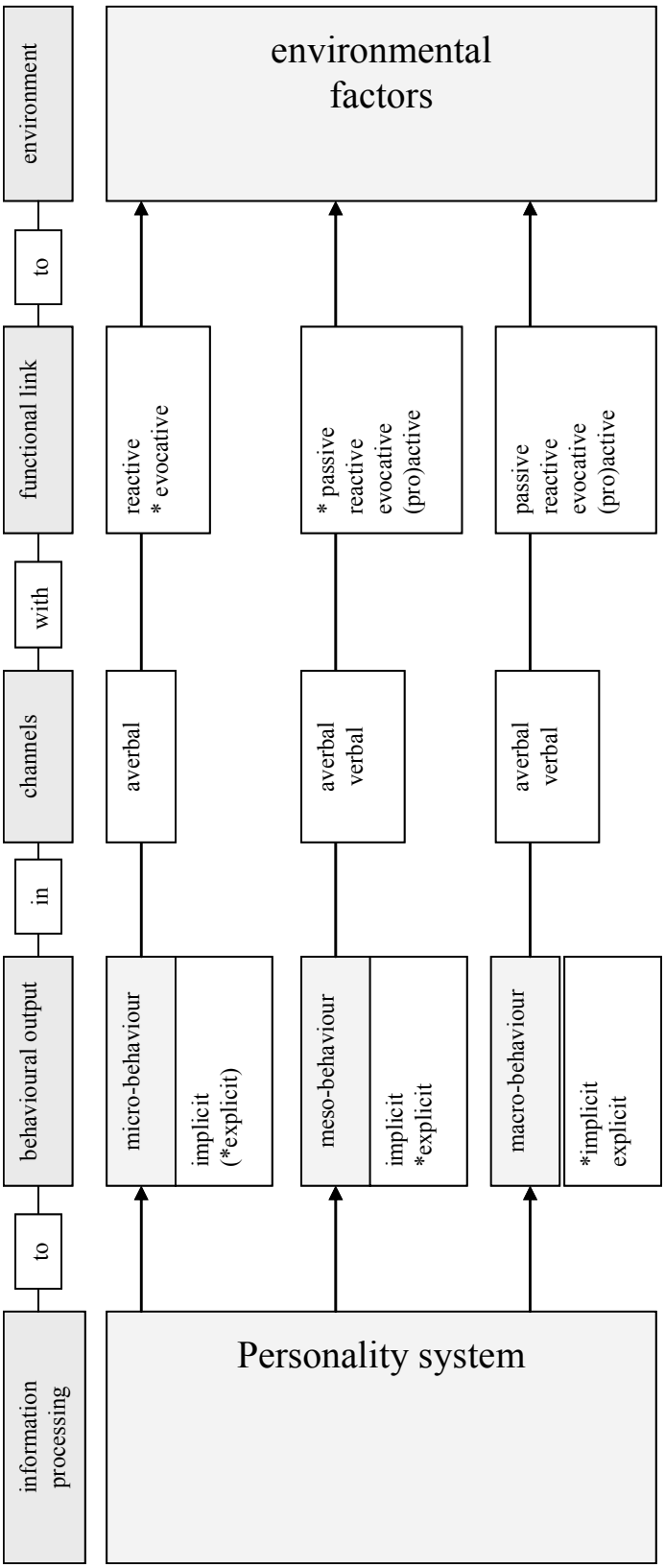

Figure 2. Different levels of behaviour and their environmental ”linkage” qualities

salient aspects to the situation filtering (e.g, thoughts, feelings, etc.) or modifying the active ones. Then, different situation components are explicitly and/or implicitly appraised and filtered. The behavioural output can occur on various levels (micro, meso, macro) and is exhibited explicitly and/or implicitly in verbal and averbal (non-, para-, extra-verbal) channels. This constitutes a certain "linkage" (passive, reactive, evocative, active, proactive) to the person's socio-ecological surroundings (niche). By this, the person "(re-) acts" to the situation and his or her surroundings (environment) as he or she can seek, avoid, bear, modify, and/or generate contexts.

Momentarily activated CAMS and behavioural (re)actions are part of the "personality" but are still rather momentarily occurring states within a dynamic flow of person–environment transaction. The latent system behind all of this provides with its chronified structures the basis or repertoire for these transactional processes. If these dynamic transactions occur with increased frequency (and in a similar manner), then emergent patterns of thoughts, feelings, desires, and behaviours may arise which are chronified step by step. States can then be transient to traits although this conceptualisation does not aim at specifically distinguishing these two concepts. All of these structures and processes can, however, only be established if the biological basis of the personality system is intact. Environmental stimuli (e.g., intoxication, car crash, radiation, etc.) can also have a bearing on (neuro-) physiological structures.

In summary, person and environment are interlocked in the following way (without the intention to give causal prioritisation to any process):

> . . . → objective environmental stimuli → different momentarily active and salient CAMS are triggered → CAMS filter objective environmental stimuli through subjective perception mechanisms relying on situation-specific information processing → subjectively perceived, psychologically active situation characteristics emerge (from the former objective environmental stimuli which were filtered and subjectified by the CAMS) → structures and processes within the personality system are momentarily highly activated and salient → subjective stimuli are processed in different modes of implicit and/or explicit information processing within the personality system → implicit and/or explicit intra- and/or extrapsychical (re)actions (passive, reactive, evocative, active, proactive; verbal and/or averbal; micro, meso, macro) emerge → different objective and/or subjective "influences" on oneself and one's surroundings (environment in socio-ecological niche; current situation or context) → . . .

A Systemic-Synergetic Personality Paradigm for SI Research

Having proposed a meta-model for dispositions which can be used to describe Trait-SI, I move forward to a systemic-synergetic conceptualisation of "personality". Trait-SI (with its behavioural manifestations from which we infer Trait-SI) is constituted by an underlying personality system. Personality should also be looked at to grasp SI within a trait-theoretical approach. SI needs to be integrated into a personality theory in order to proceed

with its trait-conceptualisation. It will be my hope that other theorists will refine the basic thoughts I propose here and that researchers will rigorously evaluate their usefulness in empirical studies of SI.

Remarks on the term "Personality". "Personality" has seen many interpretations throughout the history of its etymology. But where does the word "person" come from? Widely, the word is derived from the Latin word *persōna, -ae* "mask (of an actor), role, character; personality, person" (Kluge, 2002; Stowasser, 2004). In turn, Stützer (1975, pp. 87 et seq.) deduces *persōna, -ae* from the Etruscan *Phersu*, which is a masked figure on a mural painting dated back to about 550 BC. (Indeed, there are many loanwords from the Etruscan language in Latin.) Notwithstanding, there are also other more or less plausible derivations: for instance, lat. *persŏnare* "to sound through" (e.g., the voice of an actor sounds through his mask); lat. *per se sonare* "to sound through onself" (again, maybe a reference to sounding through from a mask?); lat. *per se una* "being one through oneself"; lat. *per-sōnare* < *per-zōnare* "to disguise" from the ancient Greek word περίζωμα [*perídsōma*] "that what has been begirded / cinctured"; ancient Greek πρόσωπον [*prósōpon*] "visage, face, mien", which obtained the connotation of "mask, role" in the New Testament. Eventually, *Phersu* seems the most likely derivation for „person". Interestingly, the ancient Greeks would have translated "personality" with ψυχή [*psuk^{h}ē*], from which we have "psyche" today. This is mainly due to its holistic grasping as it could mean "breath; vital energy, life; soul, mind, spirit; intellectual power (~ lat. *ratio*), reason, sense; temper; heartiness; place of passions and lust; characterisation of the entire person" (Gemoll, 1965, p. 815). Seemingly, the topics "living" (breath, vital energy, life), "cognition" (intellectual power, reason, sense), and "emotion" (temper, heartiness, passions, lust) are covered[13]. Interestingly, ancient Greeks about 2,500–3,000 years ago might have had a holistic meaning of "psyche = person and his or her cognitive and emotional characteristics". In a modern systemic-synergetic approach to personality, the holistic understanding of the "psyche" is revived by conceptualising "personality" as an information processing system, consisting of many macro-modules such as cognition and emotion. This exciting conceptualisation makes it easier to see SI as a trait within a personality system. After all, SI requires a more "systemic" view on personality and individual differences in order to fully integrate it and understand how it may operate.

Systems psychology. *Systems psychology*, *systemic psychology,* or *systems-based psychology* is a relatively young branch of psychology which aims at explaining such phenomena as perception, memory, cognition, affect and emotion, motor control, identity, self, consciousness, neural networks, etc. by use of *systemics* (i.e., systems theory, chaos theory, and synergetics). The field of systems psychology offers many new and innovative approaches to old phenomena and also a vast set of methodical strategies (see, for example, Haken and Schiepek, 2006; Schiepek and Strunk, 1994; Strunk and Schiepek, 2006). Little has personality psychology been influenced by systemics so far, though. However, there are exceptions such as Haken and Schiepek (2006), Kuhl (2001; PSI-theory – personality-system-interactions), Mayer (1993-1994, 1995a, 1995b, 1998, 2005; system-topics framework), and Mischel and Shoda (1995; CAPS – cognitive-affective personality

[13] These are all topics that are also covered by SI (see Figure 2, for instance).

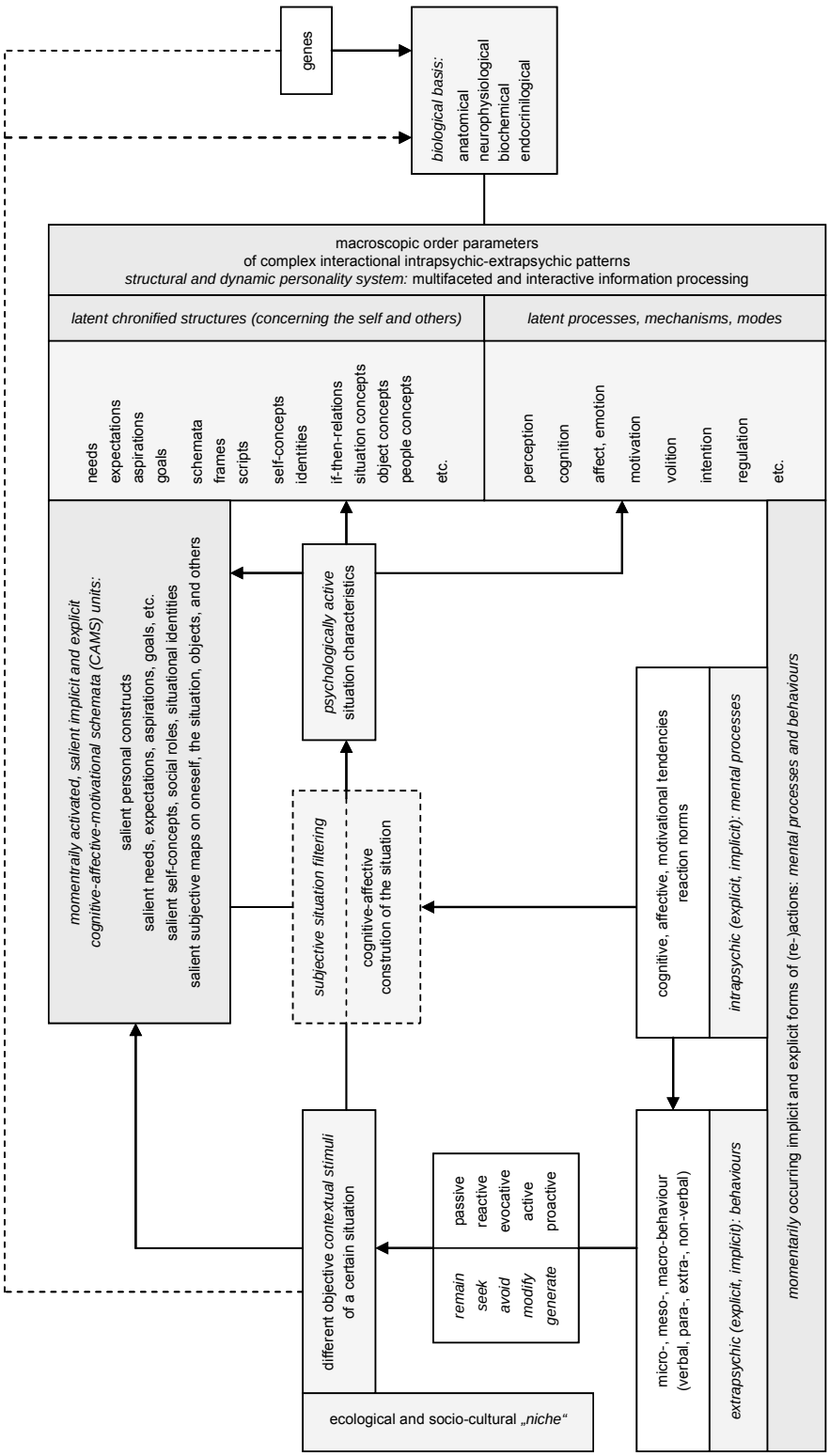

Figure 3. A disposition meta-model integrating structures, processes, and dynamics

system) who all conceptualise "personality" as a system. A *systemic-synergetic personality paradigm* should use theoretical conceptualisations, terminology, and methodological implications of systemics. Hence, the theoretical framework will be more abstract, formalised, and should allow certain properties of a personality system to be mathematised, modelled, and eventually simulated (see also Mischel and Shoda, 1995; Shoda, 2007). The "theoretical and methodological kit" of systemics can supply new powerful means and tools for research.

Conceptualising personality systemic-synergetically. SI could be nicely integrated into a systemic-synergetic conceptualisation of personality. In the following, basic properties of a *systemic-synergetic conceptualisation of a personality system and dispositions* are outlined (see also Figures 7 and 8). These should serve as a – skeletal, yet first – theoretical underpinning for a systemic view on trait-SI and its integration into a personality system.

The system of personality is defined as follows (in one long sentence):

> A person has a "personality" (in its broadest sense) – on a biological basis (genetic, anatomical, neuro-physiological, biochemical, endocrinological) and in constant reciprocal interchange (physical-material, energetic, informational) with its animate and inanimate surroundings –, which is a highly complex information processing system (functionally closed, dissipative, multidimensional, adaptive, non-linear, dynamic) and constitutes a systemic bio-psycho-environmental network in (a) varying configurational structures, (b) complex macro-, meso- and micro-organisations, and (c) multi-level interaction of explicit and implicit intra- and extrapsychical factors (mental processes and behaviours) with self-organisation as well as emergence of order parameters and attractors.

Basically, any system is a set of interrelating parts (e.g., Haken and Schiepek, 2006; Strunk and Schiepek, 2006). A pile of sand would therefore be no system: the grains of sand do not interact. When examining a system like personality we at first should analyse „1) its components, 2) how these components are organized, and 3) how the components and organization change over time" (Mayer, 1993-94, S. 106). By doing so, we can zoom in on various degrees of detail; for example, we can focus more on the macro-structure and the overall-properties or analyse the micro-structure and its characteristics.

Following core aspects characterise the systemic-synergetic view on personality:

- *Systemic-synergetic:* personality is a complex and holistic system, consisting of many interrelating and interacting parts on multiple levels.

- *Informational:* information is permanently fluctuated and processed throughout the personality system as well as internalised and externalised while person–environment inter-/transactions.

- *Highly complex:* the personality system consists of many and heterogeneous variables thatare intertwined and interacting with each other at various hierarchical and heterarchical levels.

- *Functionally closed:* the personality system can be seen as an "entity" separate from its environment; however, it can interact (transact) with it (being dissipative or permeable).

- *Dissipative:* the personality system is permeable for (informational) interexchanges and interactions with the environment.

- *Multidimensional*: the personality system can be studied on multiple levels of abstraction.

- *Adaptive:* people can adapt to certain situations and therefore exhibit adaptivity and plasticity of behaviour. As the personality system is dissipative for certain external parameters and shows self-organisational patterns, it can adapt to both internal (intrasystemical) and external (extrasystemical) parameters. Maladaptations could indicate tendencies to psychopathologies.

- *Non-linear:* a personality system cannot be analytically seen as a linear sum of its single elements. The personality system parts are dynamic and interrelated: A change in one part of the system can lead to various changes and complex effects in other parts (which can give rise to the phenomenon *chaos*). Even though the personality system may be potentially non-linear, this does not mean that the whole system behaviour per se is unpredictable and chaotic. Indeed, there are periodic phases and, due to the self-organisation and auto-regulation mechanisms of order parameters and attractor emergences, there is a certain stability, consistence, and coherence within the system – in relation to external *and* internal control parameters. Hence, the system behaviour becomes more predictable. In fact, many natural phenomena are non-linear such as the weather, for example; still, the weather can be forecast to a certain exent (knowing the deterministic processes and core variables interacting).

- *Dynamic:* personality and its factors are seen as complex interactive processes, not as static structures. The dynamicity may give rise to certain structures but these can "oscillate" and vary to a certain degree. Still, there are "preferred" intraindividual structures that occur most of the time. Every structure emerges from dynamic processes, though. For example, an emotion (with accompanying appraisals) that is exhibited by expressive behavioural patterns is a multi-level process because the information processing underlying this "emotional structure" is a dynamic process of intra- and extrasystemical information fluctuation.

- *Self-organised: periodical and aperiodical – chaotic and stable, consistent, coherent* (in relation to internal and external control parameters as well as order and attractor emergence)

An individual's unique personality pattern can be referred to as its "system gestalt" or "system configuration". Different system elements are functionally interwoven in a hierarchical and heterarchical manner, which characterises the system as multifactorial, multidimensional, multidirectional, multifunctional, and multicausal or multidetermined. These strongly interrelated system parts can be deemed as "personality domains". On an abstract level, there is a systemic informational personality network with diverse information fluctuations. Connections and pathways between subsystems (e.g., personality domains) may vary due to internal and/or external stimuli and are thus not stable under all circumstances. Hence, short-, middle-, and long term configurational patterns can be detected. Within the complex personality system, which can display periodic as well as chaotic patterns, there are also processes of self-organisation and -regulation, which makes it necessary to assume emergent characteristics from the interplay of different system compounds (see Haken and Schiepek, 2006). Basic elements of this system are intrapsychical (e.g., perception, cognition, affect or emotion, volition, motivation, intention, regulation, etc.) and extrapsychical (i.e., all forms of behaviour) processes of information fluctuation and processing (upon adopting a macroscopic view). Considering the permanent interexchange of energy (e.g., when eating proteins and carbohydrates, gaining ATP from them, and using the provided energy for activities) and especially information (cf. information theory; e.g., Shannon and Weaver, 1949; Haken, 2006), the ancient Greek phrase ΠΑΝΤΑ ΡΕΙ [pánta reĩ] "everything is in stream" (by Simplikios modified from Herakleitos) attains indeed new honours.

When speaking of personality as a systemic network, one might like the analogy of the human brain to illustrate its basic structure(s): there are certain functional modules, such as traits (stable configurations), states (transient configurations), habits, needs, motives, skills, actions, physics, etc., but these modules are cross-linked with each other to vast networks of dynamic information processing systems in which one compound influences another. These modules may be distributed throughout the entire systemic network but they still have functional focal points. The processes of intra-, inter-, and transsystemical information fluctuation and processing are an essential part to the understanding of a human being with a unique personality in his or her surroundings.

Traits are conceptualised as stable, for the system "attractive" states of information fluctuation and processing, which constitute "pathway activations" or patterns. This generates the characteristic system configuration for a specific trait in the personality system (such as Trait-SI). The personality system with its emergent characteristics and self-organisational patterns is prone to procure an "attractive state" in the course of time (i.e., system time), causing stability of information processing patterns and system-surroundings-connections. Therefore, traits can be operationalised as attractors and states as transient (meaningful and non-meaningful) fluctuations within such attractors or as ephemeral bio-psycho-social patterns. Both forms as well as the resulting dynamics and system behaviour may be mathematically computed, to a certain extent predicted, and illustrated (e.g., an der

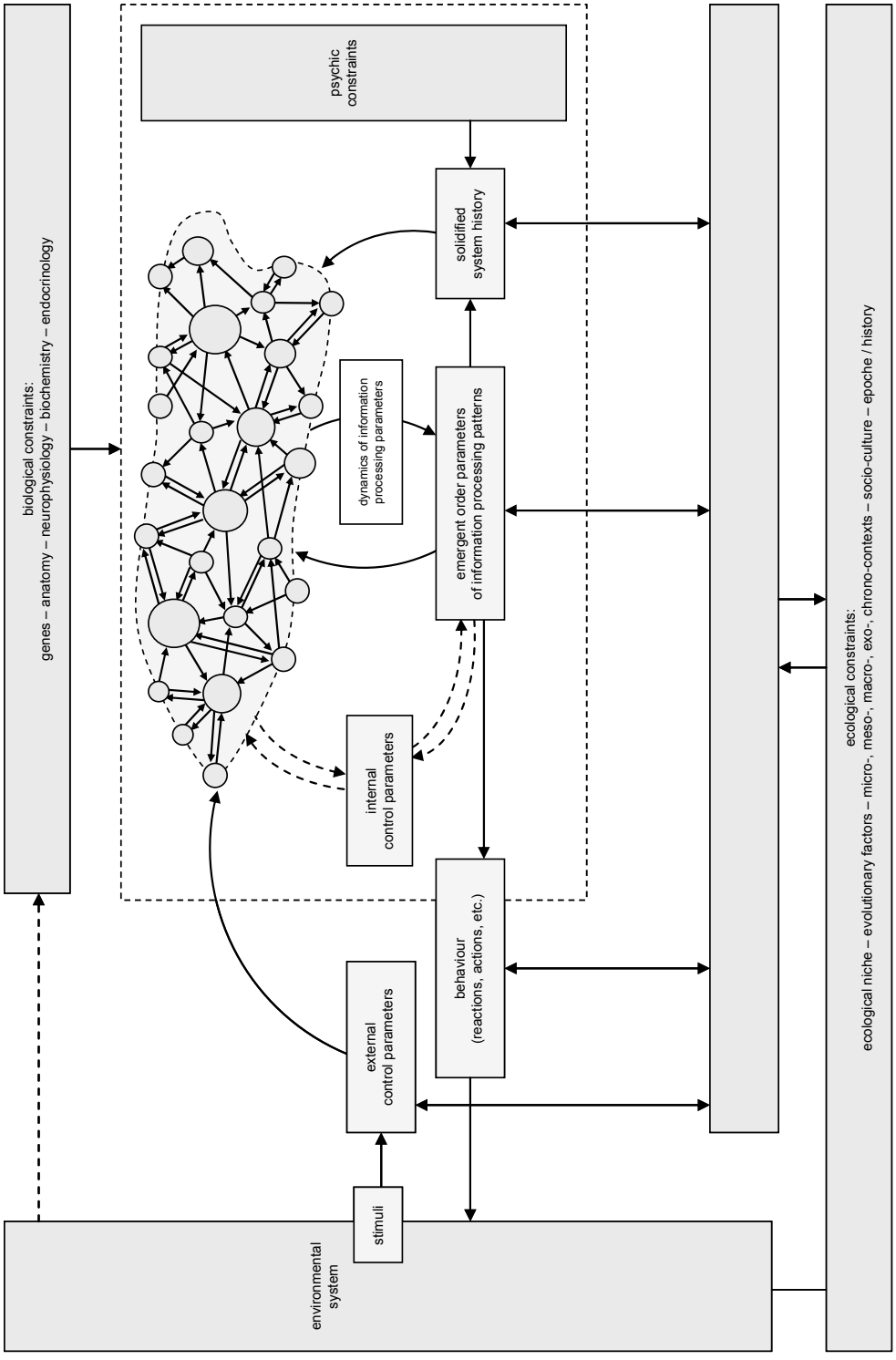

Figure 4. A systemic-synergetic conceptualisation of personality

Heiden, 1997; Ciompi, 1997; Haken and Schiepek, 2006; Kelso, 1995; Schiepek, 1999; Schiepek and Strunk, 1994).

Basic description of personality qualities in a systemic-synergetic conceptualisation:

- The personality system constitutes a wide-spreading bio-psycho-environmental network.

- The personality system is biologically based on anatomical, neurophysiological, biochemical, and endocrinological structures, expressed by genes evolved in an evolutionary process. Together, these factors are the biological "constraint" of the the personality system: any information fluctuation and processing can only be established within a functioning biological system with unique characteristics (temperamental aspects). Biological constraints may be influenced somewhat through environmental causes (e.g., ecological niche); for instance, the neuro-physiological structures can be damaged.

- Being functionally closed but dissipative, the personality system is in permanent reciprocative interplay with its objectively existing as well as internally generated surroundings (animate and inanimate). An individual also interacts with its "subjective surroundings," that is, the surrounding it perceives through its cognitive-affective-motivational schemata (CAMS).

- A constant physical-material (by the body of the person), energetic, and informational interexchange takes place intra-, inter-, and transsystemically (person systems × ecological surroundings systems).

- An interexchange constitutes passive, reactive, evocative, active, and/or proactive behavioural connections ("links") between the individual and its surroundings. These can be expressed in verbal (words, phrases, etc.) as well as in paraverbal (voice and its qualities), nonverbal ("body language": kinesics, mimics, gestics, oculesics, etc.), and/or extraverbal (physics, clothes, hair style, status, etc.) interaction patterns.

- Both serial and parallel information processing processes with various positive and negative feedback loops can be viewed from a biophysiological-chemical (e.g., gene codes, neurotransmitters, etc.), mental-psychical (e.g., cognitive and affective information processing), or environmental-social (e.g., communication, interaction) perspective.

- Multifactoriality, multidimensionality, multidirectionality, multifunctionality, and multicausality / -determination are established within the personality system.

- Intra- and extrapsychical processes merging into each other take place due to the continual interiorisation and exteriorisation of fluctuating information.

- A systemic informational personality network is constituted with specific attractive system configurations (attractors) and order parameters which will exhibit mostly stable and coherent intraindividual behavioural patterns (that only vary within a given spectrum). Also, there are transient, momentary (fluctuating) states.

- The system configuration ("system gestalt") may possess besides periodic and stable (attractive) states also chaotic and variable-transient compounds. However, dynamical processes of self-organisation and -regulation take place and constitute a certain stability, consistency, and coherence of the system, its structures, processes, and dynamics.

- The system is more or less than the sum of all its "ingredients" as the dynamic interaction between these also has the system exhibit emergent patterns as well as some unexpected behavioural outputs (chaoticity and non-linearity).

- Short-, middle-, and long-term system configurations (as connections between different elements or domains of the personality system) can be distinguished, which all together add to the development, dynamics, stability / consistency / coherence, adaptability, variability, and plasticity or flexibility of personality.

- A specific system configuration at a given time is influenced by many internal and external factors (control parameters) such as solidified system history, preceding configurations, attractors, transient states (as quasi-attractors), situational and contextual aspects, and internal and external constraints.

To summarise the preceding remarks (see also Figure 8 for an illustration):

> The bio-psycho-environmental systemic and informational personality network, resembling the "psyche" of an individual, consists of dynamic structures and interrelated configurations as well as interacting intra- and extrapsychical informational processes (explicit and implicit) in their complex and to a certain degree varying organisation.

A Systemic-Synergetic Disposition Model

Specific interpretation patterns of situations, arising from personal schemata, concepts, constructs, needs, expectations, cognitions, emotions, etc., could be understood as macroscopic order-parameters governing (or "enslaving") cognitive-affective attractors. All stimuli exhibited by external control parameters would be filtered to some extent by perceptional units of the personality system (being enslaved by their macroscopic orders). Then, specific cognitive-affective units would be triggered, thereby "activating" certain attractors or at least making them salient in relation to the contextual (subjectively) psychologically perceived external control parameter stimuli. These attractive "reaction

norms" would produce certain motor outputs, defined as "behaviour". Behavioural variability could be understood by the concept of stable individual attractors: in reaction to internal and/or external control parameters, the excursion and pond of a cognitive-affective attractor would vary from time to time (normally only within the attractive state) and thus always constitute different kinds (morphologies and intensities) of behaviour forms, which are similar (and quite often functionally equivalent) but not identical. However, the attractor could come to a bifurcation point and then could be given up for a certain amount of time, having the system show unusual transient states (that are not mere fluctuations within the pond of an attractor) and thus exhibiting behaviour forms that are not usual for it when being in the "attractive state". This would show how consistency and inconsistency may co-exist besides each other and even emerge from each other (and also keep the idea of multiple types of consistencies): depending on the specific system and attractor time, the transient state will recur after some time into the attractive state and thus reestablish the "normal" or "regular" system behaviour again.

Of course, all of this can only take place if we presume that the system (i.e., personality) is in its basic characteristics multidimensional, non-linear, adaptive, and dissipative. In short, the concept of order parameters can provide the mediating cognitive-affective-motivational interpretation units of "triggering situations" and "reactions to triggering situations". Traits as attractors can be highly variable. A complex macro-order can be defined as the emergent pattern of situational aspects perceived through mediating cognitive-affective-motivational order parameters that interpret situations and behavioural output in relation to the context, together with the underlying dynamic information processing attractors (e.g., cognitive, affective, etc.). Figure 5 summarises all the preceding points.

Trait-SI in a Systemic-Synergetic View on Personality and Dispositions

The question is: why study trait-SI (or even other forms of SI) in a systemic-synergetic view on personality, dispositions, and individual differences?

First, the previously outlined systemic-synergetic conceptualisations could serve very well for trait-SI concepts. Although my conceptualisations are far from being fleshed out, they might provide a fruitful ground for researchers. I invite other researchers to criticise, modify, and/or amend the concepts proposed here – in the hope that they might become some day a viable paradigm of studying SI within a dynamic personality system. Second, the methodology of systemics allows the conceptualisations to be modelled, and certain properties of a system can be simulated. However, it is essential to first conceptualise the constructs that should be modelled in systemic-synergetical terms. SI thus needs to be conceptualised systemic-synergetically *and* integrated into a systemic-synergetically conceptualised personality system. The high level of abstraction and formalisation of those models will then allow mathematisation. This in turn would yield specific predictions concerning the different models. Simulations could then be programmed to explore the properties of the models. Also, these models and simulations should always be compared to real-life empirical studies. Hence, *theory – empirical studies – modelling and simulating – practice* should be interlocked in the study of SI. Of course, all of this will take its time and

an extensive load of further research on SI, but it is exciting to think of what could be achieved when adopting a systemic-synergetic view on SI.

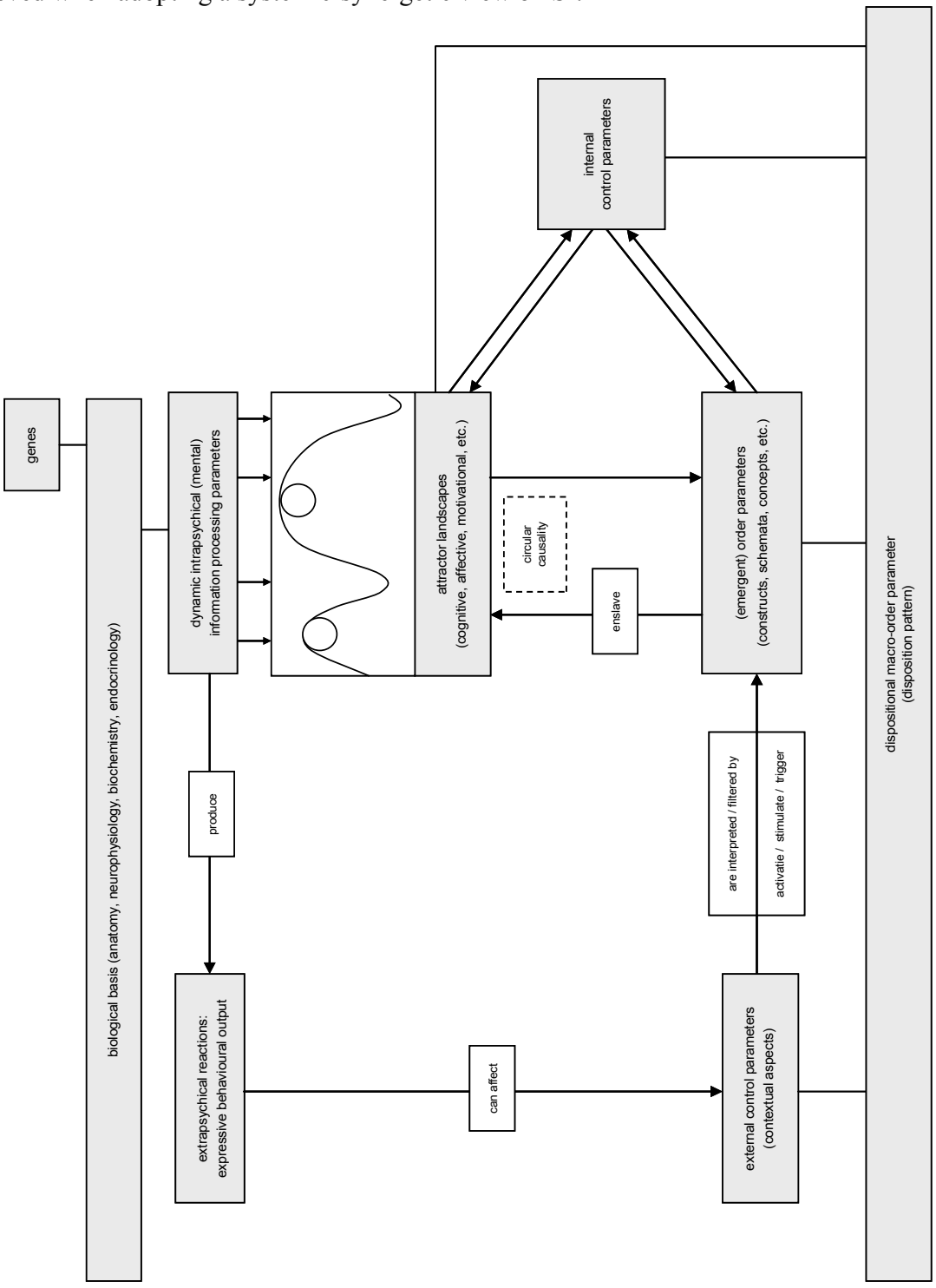

Figure 5. A systemic-synergetic conceptualisation of dispositions or traits and states

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Author

John F. Rauthmann is currently studying psychology at the University of Innsbruck, Austria. His interests and research areas are personality and individual differences.

Email: j.f.rauthmann@gmx.de

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