

Comparing Conceptions of Learning: Pask and Luhmann

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> Context • Both Luhmann and Pask have developed detailed theories of social systems that include accounts of the role of learning. **> Problem** • Rather than see the theories as competing, we believe it is worthwhile to seek ways in which a useful synthesis of the two approaches may be developed. **> Method** • We compare the two approaches by identifying key similarities and differences. **> Results** • We show it is possible to make useful mappings between key concepts in the two theories. **> Implications** • We believe it is worthwhile for social scientists to be familiar with the two theories and that it is not a case of “either/or,” rather, it is a case of “both/and.”
> Key words • Learning, conversation, interaction, expectation.

Introduction

Both Niklas Luhmann and Gordon Pask are respected as influential giants in their respective fields of intellectual endeavour. Luhmann is perhaps best known for his theory of social systems, in which he applies concepts from cybernetics and systems theory in developing a theory of social systems. Pask is perhaps best known for his application of ideas from cybernetics and systems theory to psychology. This work found fruition in his development of a theory of conversations (conversation theory, CT), which he generalised as a theory of social systems. In this paper we compare the two approaches to the characterisation of what is a social system by identifying key similarities and differences. In particular, we consider the role played by theories of learning in the two developments. We go on to consider ways in which a useful synthesis of the two theoretical approaches may be developed. (Some earlier thoughts on similarities and differences between the two theories can be found in Scott 2001).

As a psychologist, Pask's theorising is essentially “bottom-up.” His concept of a social system is built up from consideration of the processes of learning as they occur in human beings in interaction with adaptive teaching systems or with each other. In contrast, we note that, as a sociologist, Luhmann's approach is primarily “top-down.” He begins with the abstract concept of a social system as a system of communications

and calls on psychological and biological considerations as supports and justifications for that concept.¹

Central to Pask's theorising are the processes of concept acquisition and the dynamics of conceptualisation, which lead to relatively stable systems of belief. Pask also addresses the role played by non-conscious adaptations and the question of how learned behaviours become proceduralised. For Pask, human learning is always conversational, as in the dialogue between learner and teacher and the inner dialogue that guides the direction of attention and reflection. In Luhmann's theory, learning is related to the concept of expectation. Luhmann distinguishes between two types of expectation: norms and cognitions. Normative expectations are relatively fixed over time and remain more or less unchanged. If normative expectations are not fulfilled by a participant in an interaction, the reaction of other participants is disappointment. There may also be the hope that the offending behaviour is not repeated in the future.

We show how Pask's theory can account for the evolution of norms. We contrast the overall architectures of the two theories: for Pask, built on a bipartite distinction

between “mechanical” and “psychological” individuals; for Luhmann, built on a tripartite distinction between living, psychic and social systems. We also show the centrality to both theories of the concept of “double contingency” (expectations about another's expectations) and the respective conditions of connectivity (*Anschlußfähigkeit*).

In Part 1, we summarise the work of Pask up to the point where he set out his formal theory of conversations. Some of the main tenets of Luhmann's theory of social systems are set out in Part 2, with particular attention to the role of expectations. In Part 3, we summarise some key similarities and differences between the two theories and we present our attempt at a synthesis of the two theories. This takes the form of a proposed mapping between key elements in the two theories. We end with some concluding comments.

Part 1: Pask



Pask's learning theory: Early theory 1961

Pask's theories of learning evolved over a number of decades. His interests began in the mid-50s when he was developing adaptive teaching machines for perceptual motor skills. (See, for example, Pask 1958, 1982). Pask had the key insight that learning was optimised when the learner was presented

¹ | It is also worth pointing out that although Pask's specific theorising and experimental work can be seen as a “bottom-up” approach, he was also a theoriser who worked within a holistic, global cybernetic vision of the cosmos. (See Pask 1965)

with problems that were challenging, rather than boring, but not so challenging as to overload or de-motivate the learner. Pask recognised that human beings are dynamic self-organising systems. They are active and, as he phrases it in Pask (1968), “Man is a system that needs to learn” and, as such, is subject to boredom and fatigue and the active seeking of novelty, the “eating of variety” (Ashby 1956). His adaptive teaching systems gathered feedback about a learner’s progress and used this information to decide what kind of problems to present and at what rate. Pask viewed this man-machine interaction as a form of conversation where “Teaching is the control of learning.” His thinking on this topic eventually led to the development, in the early 1970s, of a formal theory of conversations: conversation theory (CT). Here, we briefly summarise the genesis of CT. We then outline its main features, particularly as they pertain to comparisons with Luhmann’s theories of learning.

Pask (1965) is a paper presented at the 3rd International Congress on Cybernetics in Namur, Belgium in 1961. It is entitled, “The cybernetics of evolutionary processes and of self-organising systems.” The paper is about 15,000 words long, which is very substantial for a conference paper. This was typical of Pask. Many of his major works are to be found in the proceedings of conferences. Such proceedings can be quite difficult to obtain, which may help to explain why so much of his work is overlooked or unknown outside of his immediate circle. The paper sets out in some detail Pask’s theory of learning as it had matured to at that point. As the title suggests, the theorising is thoroughly grounded in cybernetics and Pask spends some time setting out his understanding of key concepts in cybernetics, including black box theory, what is a system, what is a self-organising system, and what are evolutionary systems. He presents an abstract model for an evolutionary system and goes on to apply it to the domain of what he refers to as “cognitive machines” and “cognitive systems.” “A cognitive machine is the environment, usually an internal environment such as a network or a brain, wherein cognitive systems are induced to evolve,” (Pask 1965: 64). Notice that this is an analytic distinction that permits Pask to discuss cognition and, in due course, consciousness as phenomena,

irrespective of their embodiment. A cognitive system is “a linguistic or equivalently symbolic system” that is self-referential and for which learning is a form of evolution. As we shall see, this key analytic distinction of Pask’s evolves in his thinking into the distinction between “mechanical individuals” and “psychological individuals:” central concepts in CT.

Note, with respect to the distinction between cognitive machines and cognitive systems, that cognitive machines adapt. They may learn in the limited sense of being subject to the laws of behaviour as set out by Skinner and others using, in Skinner’s terms, respondent and operate conditioning. For a cognitive system, learning is a form of evolution and adaptation in response to inner and outer environmental disturbances – the symbolic evolution of concepts, where a concept is a “procedure that recognises, recalls or maintains a relation.” In learning, novel concepts are applied and, if their application is successful, they are reproduced and eventually become part of the learner’s stable repertoire of concepts.

Much of the early work of Pask and his co-workers (Brian Lewis, Richard Feldman, George Mallen, Bernard Scott) was concerned with skill acquisition. As well as experimental studies of how adaptive teaching could be used to teach complex skills, computer models of the processes of teaching and learning processes were created in order to explicate the theoretical understanding of skill acquisition. (See Chapter 6 of Pask 1975a).

The models simulate evolutionary processes by having a “free energy” economy. Only so much energy is available for the execution of the skill to solve a particular problem on any one occasion. Procedures that are successfully applied are reproduced and may be applied again on future occasions. Energy is saved by having procedures concatenate into more complex procedures. This concatenation is guided by a representation of the structure of the skill. This stimulates the phase where the learner builds up a conscious representation of the structure of the skill. With repeated application of the concatenated procedures, reference to this representation is no longer required. The skill becomes “proceduralised.” Empirical studies showed that once an efficient set of

operators has been created for performance of the skill, the conscious representation is no longer available. However, the rules of the representation continue to be available as a concurrent check on the selection of operators. The most sophisticated version of these computer models of skill acquisition is to be found in Scott (1976).

From the outset, in his research on adaptive teaching systems, Pask argued that the interaction between a learner and an adaptive system has the logical form of a conversation. Problems are posed; solutions are offered. Formative feedback comments on the effectiveness of the solutions. Man and machine may negotiate what kinds of problem should be practised.

Pask’s thinking continued to evolve. In Pask (1969) he makes a distinction between “taciturn” systems and “language oriented” systems. Taciturn systems are observed and manipulated from the perspective of an external observer. Language oriented systems are those with which the experimenter may converse. Notice that in this phase of Pask’s thinking he is anticipating the distinction between first and second order cybernetics as made by Heinz von Foerster et al. (1974), where first order cybernetics is the study of “observed systems” and second order cybernetics is the study of “observing systems.”

In that paper, Pask calls for a formal “theory of theory building.” He notes that such a theory is a reflexive theory, one that would account for its own genesis.

Conversation theory

In the early 1970s, Pask first proposed a formal theory of conversations, conversation theory (CT). The earlier analytic distinctions were now refined. Pask made a distinction between mechanical individuals (m-individuals) and psychological individuals (p-individuals), where an m-individual is a processor, such as a brain/body system, that can embody and execute the procedures that constitute a p-individual. In turn, a p-individual is conceived of as a system of concepts that is self-reproducing or, equivalently, organisationally closed.² To invoke Pask’s definitions: “A concept is a procedure that recognises, recalls or maintains a rela-

2| Pask refers to Strawson (1959) as an influence on his thinking.

tion"; "A memory is a procedure that recognises, recalls or maintains a concept"; "A p-individual is a self-reproducing system of memories and concepts."

The main area of application of CT was learning and teaching. Figure 1 shows what Pask referred to as the "skeleton of a conversation." The boxes and arrows represent the construction and application of procedures that are, in turn, embodied in an m-individual. The diagram shows just two logical levels: the lower level, where concepts are applied and feedback is obtained; and an upper level, which guides the selection, construction and reconstruction of concepts.

The horizontal connections between learner and teacher are to be distinguished from the vertical links. The latter are causal links with feedback. In contrast, the horizontal links represent conversational exchanges between learner and teacher. Pask refers to these exchanges as "provocations," by which the learner is induced to construct and apply concepts and the teacher demonstrates concepts and describes how to construct them. At the upper level, the teacher provides explanations of why particular concepts need to be constructed and applied within the context of a larger knowledge domain, whilst the learner is invited to teach back her understanding of why those concepts need to be constructed and applied. Here, we have the concept of double contingency or reciprocal expectations that is also found in Luhmann's theory (see next part), in that, whatever else is happening in the learning-and-teaching situation, the teacher is learning about the learner and the learner is learning about the teacher, giving rise to higher levels of perspectives and metaperspectives (cf. Laing, Phillipson & Lee 1966) and expectations of expectations. For example, the learner will have a perspective (expectations) about the teacher, which may include the learner's perspective (expectations) about the teacher's perspective (expectations) about the learner.

In CT, understanding is said to occur when the learner can successfully teach back both the conceptual "why" knowledge and the procedural "how" to the teacher's satisfaction.

For learning and teaching, Pask distinguished between "strict" conversations and "non-strict" or "open" conversations. In a

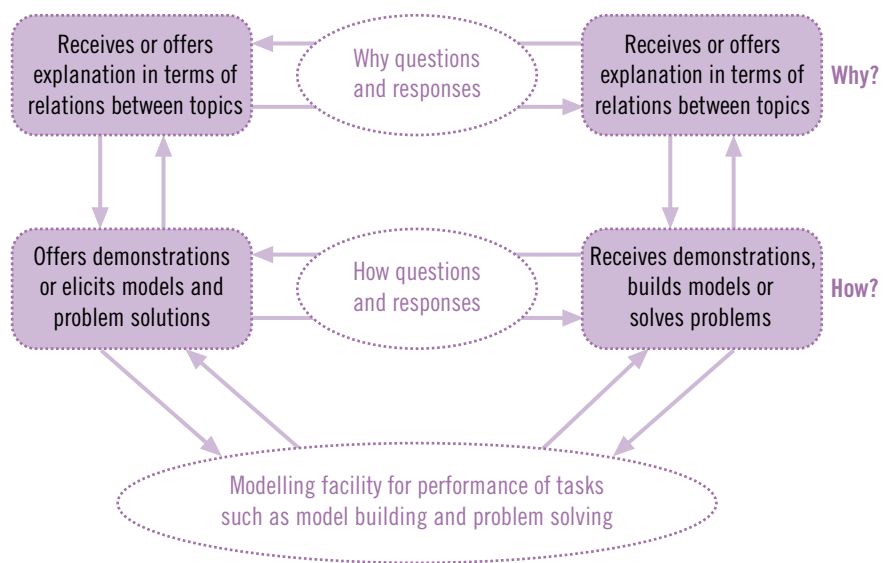


Figure 1: The skeleton of a conversation (after Pask 1975b).

strict conversation, there is a well-defined "conversational domain," a specific body of subject matter that is being learned and for which there is a detailed specification of the content of the domain as relations of logical entailment between topics ("why" knowledge) and of operations that the learner should be able to carry out if a particular topic has been understood ("how" knowledge). Pask and colleagues developed a knowledge and task analysis methodology for analysing and representing conversational domains (Pask, Kallikourdis and Scott 1975).

Strict conversations have a beginning and an end, the point at which the learner has understood all that there was to be taught. In open conversations, the conversational domain evolves. Open conversations are, in principal, endless. They may be temporarily suspended but can be reconstituted when the participants encounter each other at some time in the future.

With echoes back to his earlier conception of cognitive systems as being symbolic, self-referential entities, with CT Pask explicitly takes his thinking a step further than hitherto. He argues that the processes within a p-individual (qua cognitive system) are conversational in form. As discussed by Vygotsky, Mead and others, human consciousness has the form of an inner dialogue, a

conversing or knowing with oneself. By the same token, Pask argues that all conversations are p-individuals, evolving systems of concepts, albeit embodied in one or more m-individuals. With this one stroke, Pask unifies individual and social psychologies. A social system is a p-individual, a conversation in which the participants are also p-individuals and construing themselves to be members of the social system in question. Note that this formulation affords the construction of nested hierarchies of participating p-individuals that constitute subsystems within a superordinate p-individual. (On this theme, see also Boyd 1993)

Pask's primary field of endeavour was psychology, rather than sociology, although there are several places where he discusses social systems from a cybernetics perspective (Pask 1966, 1973, 1979). We are not aware of any specific discussion of the formation of norms. In terms of Pask's learning theory, we can see this as a special case, where the learner is acquiring, by adaptation, induction or direct telling, knowledge of the rules that he or she should be using to guide behaviour. Notice that the analytic distinction between m-individuals and p-individuals allows us to distinguish two species of mechanism whereby behaviour becomes normative. On the one hand, an m-individual is subject to the laws of con-

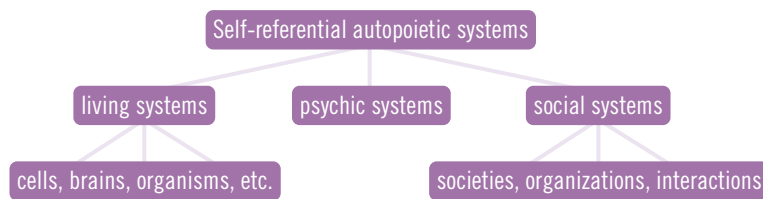


Figure 2: Classification of systems (after Luhmann 1990a: 2).

ditioning, as set out by Skinner and others. Notice that this is, by definition, a form of adaptation about which there is a lack of awareness. On the other hand, there may be the conscious learning of norms, as per descriptions that have been induced from examples or prescriptions that have been provided by the teacher or other guide, such as a parent. With repeated performance, as with other skilled behaviours, the behaviours may become automatic or “proceduralised” and performed without reflective awareness.

Bernard Scott worked with Pask for a ten-year period as CT was being developed and applied (Scott 1993). Scott has used CT in his investigations of communication within social organisations. In Scott (1987), he uses CT to inform his discussion of the role of an educational psychologist, working as part of a community. In Scott (1997), the discussion is taken further to give a detailed account of the inadvertent pathologies of communication that can arise in social organisations. Other papers by Scott applying CT to communication problems in social organisations include Scott (2002), where he proposes a model for the development of organisations as learning communities, and Scott (2006), in which the power relations within social organisations are considered.³

3| In a late stage of his career, Pask, working with Gerard de Zeeuw at the University of Amsterdam, developed the “Interaction of Actors” theory as a generalisation of CT, where an actor (individual or collective) is an “embodied p-individual.” Our coverage of Pask’s ideas presented here are consonant with these later elaborations. For more, see Pask & Zeeuw (1989, 1991, 1993), Zeeuw (2001).

Part 2: Luhmann

Learning conceptualised within the framework of social systems theory

The theory of social systems as developed by the German sociologist Niklas Luhmann reconstructs society as a self-reproducing (autopoietic) system of communicative interactions. “Society carries on communication, and whatever carries on communication is society.” (Luhmann 1995a: 408) Luhmann distinguishes several types of social systems (Figure 2): (i) “interaction systems” as the minimal form of realisation of social relations (face-to-face communication), (ii) “encompassing societies” which – under modern conditions – converge to a world society, differentiated into function systems such as economics, science, education or politics, and (iii) “organisation systems” as decision-communicating entities based on membership relations. Learning occurs on all levels. However, the dynamics of “face-to-face learning” on the level of interaction systems is explored in detail to inform the Pask-Luhmann comparison.

The next step in locating “learning” within the framework of social system theory requires that two categorical distinctions must be taken into account. First, it is important that within the framework of this theory a distinction is made between psychic and social systems. In combining several approaches – in the main the work of Edmund Husserl (2003) on the one hand and of Humberto Maturana and

Francisco Varela (1980) on the other – Luhmann defines social systems as based on “acts of communication” and psychic systems as based on “acts of consciousness” (Luhmann 1995a: 255ff). Second, in the theory of social systems, persons are not congruent with psychic systems. “Person” is defined as a social phenomenon attributed to “individual psychic systems.” This attribution is twofold: one is a person for oneself and for others. Consequently, “Persons cannot emerge and continue to exist without social systems, nor can social systems without persons” (Luhmann 1995a: 59). Since both person and psychic system are related to a physical body (Figure 3), they can be treated as a unit in day-to-day interaction. Although Luhmann’s categorical discriminations are controversial when discussed in the social sciences – for example, by Jürgen Habermas (2007) – the transition from “subject” to “system” and the distinction between social and psychic systems opens up new possibilities for the analysis of social structures beyond language- and subject-centred meaning. One of the possibilities can be found in the concept of expectation. According to Luhmann, social systems are structured by expectations: “[...] structures of social systems consist in expectations that there are structures of expectation and that there are no other structural possibilities for social systems, because social systems temporalise their elements as action-events” (Luhmann 1995a: 293).

The location of “learning” in Luhmann’s social systems theory lies in the concept of expectation. This is done by using a simple rule (Luhmann and Schorr 1988: 87; Luhmann 1995a: 320f):

- whereas “normative expectations” (norms) are relatively fixed over time and remain more or less unchanged,
- “cognitive expectations” (cognitions) may be modified by learning.

Since an expectation plays such an important role in conceptualising learning in the theory of social systems, in the following this concept is discussed in relation to “interaction system” and “meaning.” Thereafter, learning will be described by using a specific interaction-system situation – teacher and learner – as an example.

Interaction system, meaning, and expectation

An interaction system is constituted by one communication unit following another. The system comes into being if at least two constituents are given (Luhmann 1995a: 412ff): individuals must be present – face-to-face – and communication units can only be understood in the context of the system. The context of interaction systems is given by a shared meaning system. In every act of communication, meaning is actualised two times because communication is conceptualised as a three-part unity (Luhmann 1995a: 137ff):

- Information is a selection from a repertoire of possibilities – structured by meaning. The act of selection is a psychic act, carried out by a psychic system, labelled “alter.”
- Utterance (*Mitteilungshandeln*) is an act of duplication of information. This is done by coding, whereby the information is presented in a particular form (for example, acoustic, linguistic, written). Coding must be treated in more or less the same way by both the speaking individual “alter” and the individual addressed “ego.” Whereas the selection of information is carried out by the psychic part of an individual, the utterance is produced by the organic part (human body) of him or her.
- Understanding takes place within the psychic system of the addressed individual “ego.” That is, ego must understand what it means to accept alter’s selection. This says nothing about the acceptance or rejection of what is uttered. Communication as a three-part unity is completed when understanding happens. Only the next communication unit is determined by acceptance or rejection of the previous one.

Luhmann emphasizes in his elaborations the importance of understanding by introducing the routine of labelling the addressee “ego” and the uttering participant “alter.” (Luhmann 1995a: 141) Since every participating individual within an interaction system alternates as alter and ego, the terms “agent A,” and “agent B” are used to distinguish different individuals (Figure 4).

An important, but secondary, element of communication as a three-part unity is

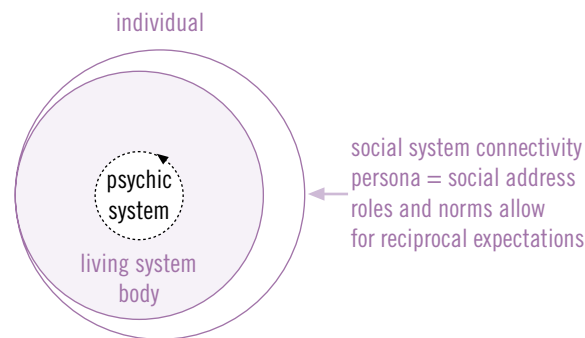


Figure 3: The individual – psychic system and persona and human body. An interacting individual requires a human body as well as a psychic system and a social address (person/persona), which are related to three different categories of systems: (i) psychic system, (ii) social system interface (person/persona) and the living system infrastructure (human body with physical, chemical, and organic systems and processes) (Luhmann 1995a: 244ff). “Persona,” in the psychology of C. G. Jung, relates to the mask of the ancient Greek theatre – a kind of social vehicle for expressing a certain context-specific part of oneself. The persona “navigates” the space between the inner world of ego (psychic system) and the outer world – i.e., it allows that an individual performs different roles according to specific social contexts. “What results – as can be read in the etymology of persona (mask, role, legal status) – is a differentiation of person and role.” (Luhmann 1995a: 315) Norms – usually related to a certain role – help to modalise expectations (see below normative and cognitive expectations).

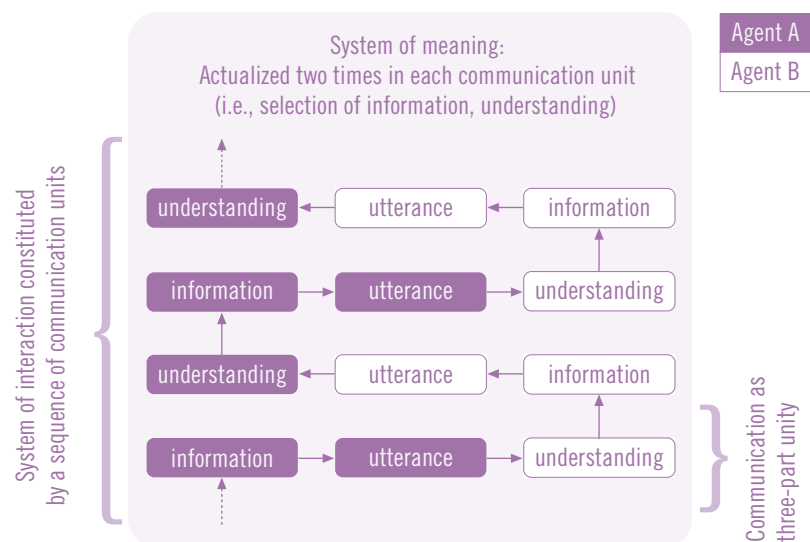


Figure 4: Meaning and interaction (Buchinger 2008: 642).

“action.” First of all, in social systems theory, communication cannot be conceived of as action, nor can the process of communication be conceived of as a chain of actions. Communication includes more selective events than just the act of utterance and the process of communication is grasped insufficiently if only the trigger-capacity of utterance is considered and the selectivity of information and understanding is ignored. Nevertheless, since communication cannot be observed directly, it must be “flagged” as an action system (Luhmann 1995a: 163ff) whereby the acts of utterance serve as signs either for selection of information or for understanding.

Information and meaning

Information production presupposes that “alter” not only views himself or herself as part of a general meaning world, but assumes also that the same is true for “ego.” In other words, alter and ego act on the basis of the assumption that each life-world is part of the same general meaning world in which shared meaning structures allow alter to generate an expectation of success, i.e., the expectation that the selection will be accepted by ego. Luhmann uses the term “meaning-constituting system” to make clear that meaning is not a particular fact or matter in the world, but the way human experience is ordered. “[...] when I refer to meaning-constituting systems I am not speaking of some source of energy or some kind of the psychic-organic bases of meaningful experience, and certainly not of the concrete individual, but rather of an interconnected complex of meaning (*Sinnzusammenhang*) as such. This includes both psychic systems – as far as they are identified (by anyone!) as the unity of a meaningful related complex of actions and experiences – and social systems.” (Luhmann 1990a: 24)

To conceptualise a meaning-constituting system, Luhmann integrated the biological concept of autopoiesis (Maturana & Varela 1980) and the philosophical concept of meaning (Husserl 2003). From Husserl he derived the idea of an endless, universal meaning-horizon, within which individuals refer to objects (intention); from Maturana and Varela he adopted the idea of circularity and reproduction. (For a detailed discussion of the philosophical and biological roots of

social systems theory, see Buchinger 2006). Interaction starts with a situation-related or even randomly chosen meaning-context and, within each communication, meaning is actualised and thereby reproduced. Whereas meaning serves as a “selection rule,” information is a “certain selection” (Luhmann 1990a: 30ff). It must be noted that communication is not a process of transferring meaning into information. Instead, communication is a correlated actualisation of meaning between at least two individuals. The idea that information is a product, i.e., the outcome of a selection process, is inspired by the information theory of Claude E. Shannon and Warren Weaver (Shannon 1949; Weaver 1949). Contrary to information theory, which considers information on the basis of entropy by means of statistics, social systems theory relates information to meaning and the act of understanding.

Language provides a kind of substructure of meaning. It determines the conditions of linguistically possible sentences (Luhmann 1990a: 51). But language alone is incapable of establishing meaning; this occurs only if psychic systems are using it in interaction systems.

Structures and operational closure of interaction systems

As outlined above, an interaction system is constituted by the presence of at least two participants and a “stream of units of communication.” They are operationally closed (autopoietic, self-referential, reproducing) systems because every communication element is recursively connected. If one communication unit follows another it is a positive test of whether understanding in the previous communication unit was sufficient. Every communication unit is therefore recursively secured in the possibilities of understanding and the control of understanding in the connective context. It follows that interaction systems are closed with respect to the presence of individuals that are communicating for at least a certain amount of time. Conversely, interaction systems are open with respect to the nature of participants, the time of communication and the nature of the communication theme. “They include everything that can be treated as present and are able, if need be, to decide who, among those who happen

to be present, is to be treated as present and who not” (Luhmann 1995a: 412). Although interaction systems disintegrate with absence, absent individuals can also be dealt with. Individuals who belong to a certain point of time to the environment of an interaction system and are therefore “noise” or “disturbance” can – up to a certain number – easily be integrated and will become part of the system by linking to the communication process.⁴

Interaction systems are primarily structured by centring, which is achieved on the one hand by only one person speaking (others are listening/understanding) and on the other by the themes of communication. “Communication is coordinated selectively” (Luhmann 1995a: 154) insofar as it comes about only if ego fixes his or her own state on the basis of uttered information. That means that the first utterance in an interaction system offers only a selection, and without reaction nothing can be said about whether communication happened or not. Therefore, communication becomes a process because of the difference between “themes” and “contributions,” whereby themes regulate who can contribute what. Beyond that, themes provide structures because of their factual content (topic/theme), their temporality (e.g., the option of recalling earlier contributions, the saturation point after which new contributions are no longer anticipated), and their sociality (attitudes, experiences, wishes, discernment, interests).

Interaction dynamics: Double contingency and expectation-expectation

In social systems theory, the dynamics of a communication sequence are explained by contingency and the respective conditions of connectivity (“Anschlußfähigkeit”). First, contingency arises because agents are complex systems that are “black boxes” for each other. An agent will never know exactly what the other will do next. The reciprocity of social situations results in double contingency: ego contingency and alter contin-

4] For example in a public place, such as station or a shop, when two individuals discuss a train delay or a sale and another individual or several other individuals start to contribute.

gency. Second, the “black-box problem” is solved by expectations. Agents create expectations about the future actions of the other agents in order to adjust their own actions. For example, two business partners meeting antemeridian expect from each other that the adequate greeting is “good morning” (and not “good evening”). This is a situation with high expectational security. If the two had a conflict last time they met, the expectational security may decrease (will the other answer my greeting?). The example should illustrate that expectations are “condensed” forms of meaning structures – embedded in the personal life-world they provide an agent-related mental map for communicational decisions (i.e., selections, choices). Based on the societally given and biographically determined structures of expectations, ego and alter have situation-specific reciprocal expectations.

In social systems, expectations are the temporal form in which structures develop. But, as structures of social systems, expectations acquire social relevance and thus suitability only if, on their part, they can be anticipated. Only in this way can situations with double contingency be ordered. Expectation must become reflexive: it must be able to relate to itself, not only in the sense of a diffuse accompanying consciousness but also so that it knows it is anticipated as anticipating. This is how expectation can order a social field that includes more than one participant. Ego must be able to anticipate what alter anticipates of her to make her own anticipations and behaviour agree with alter’s anticipation. The duplication of contingency causes the duplication of expectation:

- Alter has expectations vis-à-vis ego.
- Ego knows that alter expects something from her but can never know what exactly the expectation is (black-box!).
- Therefore, ego builds expectations about “alter’s expectations of ego,” that is, expectation-expectation (Figure 5).

In complex societies, expectational security is difficult. Therefore it is necessary to have stabilising factors. One way to establish expectations that are relatively stabilised over time is a relation to something that is not itself an event but that has duration. Expectational nexuses in interactions are, for example, persons, roles, programmes and

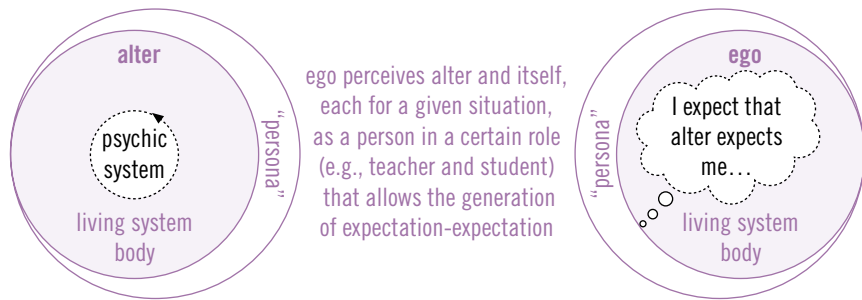


Figure 5: Expectation-expectation.

values (Luhmann 1995a: 315ff, 1989: 254, 1997: 621). Persons are societally constituted for the sake of ordering behavioural expectations. Roles serve – compared with persons – as a more abstract perspective for the identification of expectations. Last but not least, values are highly general, individually symbolised orientation perspectives. Beyond that, “security nets” (Luhmann 1995a: 323) are provided on the level of function systems through symbolically generalised communication media⁵. From this perspective, the function systems, law and science and their respective media, power⁶ and truth,⁷ provide general security (in law- and knowledge-based societies). The function system “education” with the medium “individual curriculum vitae”⁸ provides specific

security for the case of learning in institutional contexts. Roles help individuals to figure out in which respect they can realize organisational as well as functional inclusion.⁹ For the case of learning, this is, for example, the so-called professional role “teacher” and the complementary role “student” (Figure 5). Programmes of the education system are, for example, curricula (Luhmann 1987: 206) and values are, for example, capacity, proficiency or diligence (Luhmann 2002: 50).

For Luhmann, the emphasis on expectation-expectation forbids the construction of an inner dialogue as an interaction system (Luhmann 1995a: 272). It lacks an internal form because there is no second “I” and no

5| Symbolically generalized communication media are a macro-sociological construct that – according to social systems theory – evolved together with function systems (Luhmann 1995a: 149; 1990a: 86ff; 1997: 316ff). Function systems are guided by a binary code oriented towards certain communication media that enable selection. For some function systems, it is difficult to identify a communication medium and/or a binary code (see education system).

6| Power is a symbolically generalised communication medium that has a double binary coding, i.e., a political one in the form of the binary code government/opposition and a legal one in the form of the binary code, legal/illegal or permitted/forbidden (Luhmann 1993, 2000b).

7| The function system “science” has the binary code true/false (Luhmann 1990b)

8| Luhmann seems to be quite sure that a functional differentiated system of education ex-

ists, but concedes that the identification of the corresponding medium is somewhat artificial (Luhmann 1995b: 208). He investigates several options thoroughly and concludes that “child” as a social construct can serve as education’s medium (1995b: 199), whereby there is a 20th century tendency that “child” could be preplaced by “curriculum vitae” (2002: 93). According to the difficulties with the medium, binary coding in the system of education is difficult, too. The discussion about the adequate binary coding comprises “CV/career” together with hard codes such as “admission/non-admission, moving-up/repeat-class or examination-passed/examination-not-passed” and an additional soft code in the form of “marks or grades” as a kind of puffer (Luhmann 1987: 196ff, 2002: 72ff).

9| See for inclusion and the role-concept in terms of “complementary roles” and “membership roles” Luhmann (1997: 725/739/771, 1995a: 316, 1977: 36, 2000a: 88ff), Stichweh (2005), and Parsons (1964: 61).

Gordon Pask	Niklas Luhmann
one p-individual (emerging in the course of "conversation")	interaction system (emerging in the course of meaning-based "communication")
many m-individuals	two or more individuals
one p-individual one m-individual ("internal conversation")	psychic system related to the social phenomenon "person" and depending on a body ("psychic acts")
m-individual (brain/body system and augmentations)	body (living system; organic/bio-chemical systems)

Table 1: Main constituents of Pask's and Luhmann's theories in comparison.

"me" vis-a-vis an "I" that examines whether it will accept or reject. Of course, there are internal self-descriptions that serve to simplify reflections. But these self-descriptions do not have the quality of an "alter" or "ego" with respect to an addressee that triggers expectation-expectations.

Roles, expectation-expectation and learning

A typical learning situation is based on the complementary roles of teacher and learner. Let us assume first that the teaching context is an elementary school. This means that the interaction depends on the roles "teacher" and "pupil" and occurs in an organizational system oriented towards the medium "curriculum vitae." It means further that part of the meaning-frame of their interaction is the fact that the hard codes and soft codes of the education system will be used (hard code: moving-up/repeat-class; soft code: marks/grades). Let us assume next that the teaching content is the mathematical problem of calculating with fractions. This refers to the science system and the existence of a scientific "truth" in the form of mathematics. Such a situational context predefines expectation-expectations of the teacher as well as the learner to a great extent. First, this situation allows for a clear distinction between normative and cognitive expectations.

- Normative expectations are relatively fixed over time and remain more or less unchanged. If normative expectations are not fulfilled by a participant in an interaction, the reaction of other

participants is disappointment. There may also be the hope that the offending behaviour is not repeated in the future. Normally, disappointment will not alter normative expectations. Concerning norms, the learner's (pupils) expectation-expectation is that he or she is the one to be taught and that the teacher is the knowledgeable one. The teacher will, with high probability, reconstruct the reciprocal expectation-expectation. Further, it will be a normative part of both expectation-expectations that the teacher is the one who decides at the end of the semester/year whether the pupil will move up or repeat the class on the basis of marks/grades.

- For cognitive expectations, the opposite is true. Someone is ready to change them if reality reveals other, unanticipated aspects. Thus cognitions are expectations that are disposed toward learning, while norms are expectations that are not disposed toward learning. Concerning cognitions, both parties will include in their expectation-expectation that the teacher will remain stable in the course of the lesson with his or her expectations about what a correct and what an incorrect solution of a certain calculation of fractions is. Both parties will also include in their expectation-expectation that the pupil should be ready to change his or her solution-expectations in response to the teacher's indications/corrections.

One can easily deduce that a change of participants, which includes a change in the

roles, too, alters the situation significantly. If, for example, two school teachers interact in discussing effective methods of teaching calculations with fractions, the main part of the interaction sequence will be dominated by normative expectation-expectations, because the roles are now "expert meets expert." That is, each of them will probably have the expectation-expectation of being an expert and will therefore be ready to contribute experiences of successful methods of fraction-teaching. They may even depart with the greatest reciprocal respect if each of them intends in the future to stay with his or her method and expresses this at the end of the discussion/interaction. No learning happened in this case because of insufficient cognitive expectations. Part of their interaction may also be that they refer to different theories of teaching as scientific truth. If there is disagreement about scientific truth, the context may change to the function system "science" and to an organisational system such as a university of education or a research institute concerned with questions of education. In the latter, the probability of cognitive expectation-expectations and learning is higher compared with the school context, for example, when the communication involves several scientists from a research team meeting in the course of a research project whose aim is the comparison of the effectiveness of different methods of teaching fractions.

Part 3: Pask and Luhmann compared

The architecture of the two theories is shown in Table 1. We have placed them side-by-side show some correspondences between the two theoretical structures. As noted in the introduction and in the theory-related sections, Pask uses a bipartite distinction between "p-individuals" and "m-individuals," whereas Luhmann has a tripartite distinction between "psychic systems," "social systems" and the "human body" (belonging with its physical, chemical and organic systems and processes to the category of living systems). In the architecture of Pask's theory, we have made a distinction between the situation where one p-individual is conceived of as being em-

bodied in one m-individual and the situation where one p-individual is conceived of as being embodied in many m-individuals. This allows us to present an approximate way in which components of the two theories can be seen to be in correspondence. We say “approximate,” because, possibly with the exception of the m-individual and living system correspondence, the correspondences are between different kinds of theoretical entity.

- One or more p-individuals embodied in a single individual is a different kind of construct from that of a psychic system, even if inner dialogues are possible (although not in the form of an interaction system).
- One p-individual in many m-individuals is a different kind of construct of what is a social system from that of a system of communications, but has a certain correspondence to what is described in social systems theory as a system of meaning.

We need to go to a finer grain of analysis to highlight the similarities between the two theories. Despite their different aims, there are some commonalities between the two theories.

The key difference that we have emphasised is that Pask began his work with a focus on explaining learning and developing a theory of learning and teaching as a process of conversation between learner and teacher. In contrast, Luhmann began his work with the aim of explaining society in terms of systems of communication, functional differentiation and the building up of rationalities (functional rationalities, organisational rationalities).

The similarities between the two theories come to light when we look at how they deal with “dyadic interaction” or, in common parlance, interpersonal communication. For Pask, such an interaction is a “conversation.” For Luhmann, such an interaction is an “interaction system.” We can summarise commonalities between the two constructs, conversation and interaction system, as follows.

- A central concept that is shared by both theories is that of “understanding.” Pask is interested in how conversations lead to understanding, in particular, how a learner comes to understand the thesis being presented by a teacher. Luhmann

emphasises that interaction depends on understanding as a prerequisite. The participants in an interaction must have expectations about each other’s expectations that correspond at least insofar as further communication is possible. That is, participants in an interaction system trust that there exists a shared meaning system in which human experience is ordered (themes, roles, values). They are interacting within an agreed framework of rules and norms. Pask makes the same point in a slightly different way. First, he acknowledges that prior to any learning and teaching conversation taking place, a “learning contract” has to be established between the learner and teacher. This learning contract establishes expectations about how the conversation is to proceed, as an evolving system of concepts,¹⁰ following agreed-to norms and with agreed roles. Contrary to this, Luhmann discusses certain situational contexts for learning. Hereby, something like a learning contract is not negotiated but rather is clarified in role specifications, for example, a teacher-pupil constellation in organisations such as schools or a teacher-student constellation in organisations such as universities. Pask also noticed that within the dynamics of the conversation the roles may be renegotiated. A learner may become a teacher and vice versa. This case is, of course, not excluded in Luhmann’s social system theory but not addressed explicitly, since the framing of functional and organisational rationalities are of primary interest.

10| At a high enough level of abstraction, the terms “system of concepts” and “meaning system” can be considered as synonyms. Particular differences arise in how the two concepts are elaborated by the two theorists. Pask’s approach is that of a process theorist, where “meaning” resides in the logical relations between concepts and the consequences of their application, whereas for Luhmann, who takes his concept of meaning from the writings of Husserl, “meaning” refers to an undetermined horizon of possibilities (endless horizon, etc.) and does not exist as an external reality but resides in the self-referential structure of a consciousness.

- Also common to both theories is the concept of “acting.” In a Paskian conversation, the participants may be called upon to perform. As well as exchanging verbal explanations, they may be required to give practical demonstrations of what it is that they are talking about. In a Luhmannian interaction, the act of utterance is not only of importance, but essential. A complete “communication element” requires an utterance that can be verbal as well as non-verbal. Practical demonstrations are, of course, not excluded but do not have a specific relevance.¹¹
- Both theories also emphasise that the communication that is taking place is guided by a topic (Pask) or, equivalently, a theme (Luhmann).

In common parlance, the topic or theme is that which is being discussed or talked about. For Pask, the topic may change by negotiation. As understandings occur, learner and teacher may negotiate what topics should be addressed next. As Pask notes, this implies that the conversation itself may be a topic for conversation. Luhmann refers to a theme as something that structures communication. It, too, may change as the interaction proceeds. He also notes that the interaction itself may be the theme of the interaction.

In Figure 6, we show a proposed mapping between the two theories based on the foregoing analysis. We believe that at this level of analysis there is a very close correspondence indeed between a Paskian conversation and a Luhmannian interaction system.

We further believe that a useful synthesis can be made between the two theories, building on the strengths of both. In particular, we note that:

11| Of interest here is the distinction between an “action system” and a “communication system.” Our view is that, within an interaction system, action in the form of an “act of utterance” is a necessary but not sufficient constituent, since information/understanding is labelled as action. Nevertheless, from the perspective of an observer, communications can be observed only as actions and actions may be perceived as communications.

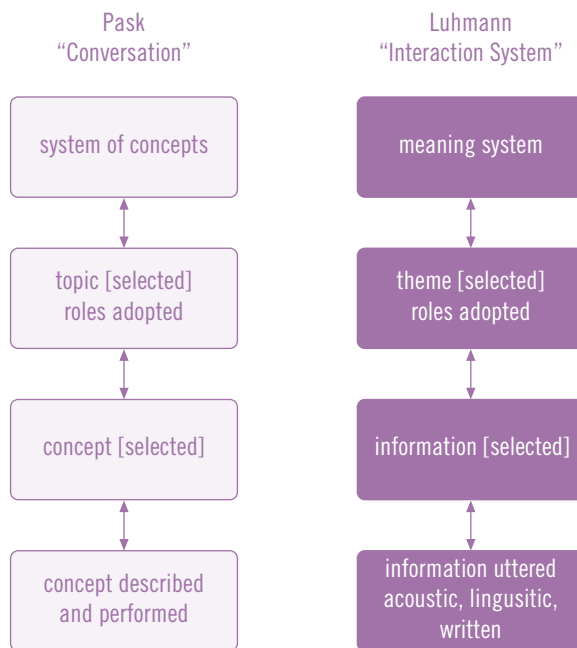


Figure 6: Conversation and interaction systems – a proposed mapping.

- Pask provides a rich account of learning as the evolution of concepts within a conversation
- Pask's concept of societal structures is underdeveloped.
- Whereas:
- Luhmann's account of learning in interaction systems is quite basic
- Luhmann's concept of a societal structure is rich and elaborated.

The importance of "understanding" in the two theories provides a conceptual bridge between them. In both theories, shared understandings are required constituents for the emergence of (communicative) systems. Whilst novel understandings (and misunderstandings) may arise in interaction/conversation, the possibility of interacting/conversing depends on the a priori understanding/shared meaning-system that the participants bring with them to the interaction/conversation, in particular their (often tacit) understandings of what it is to interact/converse.

Conclusions

In attempting to compare and contrast the theories of Pask and Luhmann, we realise we could easily be criticised for attempting to compare "apples" and "pears." However, we believe we have demonstrated enough commonalities between the two theories to show that the exercise is worthwhile.

Although he began with the particulars of learning and conceptualisation, Pask, as a cybernetician, always had an eye for the bigger picture. It should be no surprise, then, that he concerned himself with understanding social systems and societal structures. As we noted at the outset, his approach was bottom-up, from more of a social psychologist's perspective than that of a sociologist, albeit that as a cybernetician he was global and holistic in his wider interests. In contrast, we have pointed out that Luhmann worked top-down as a sociologist. His macro theory of social systems is sophisticated and well-developed. His micro theory of interaction

systems is relatively impoverished from a psychological point of view. Hopefully, we have shown that a useful synthesis can be made between the two theories. Certainly, in the pragmatic sense of having useful models that can guide problem solving, the two theories can be considered as complementary: Luhmann's theory best lending itself to the functional analysis of societies; Pask's theory best lending itself to the dynamics of social interaction between individuals and within collectives. Our thesis is that it is well worth while, as social scientists, to be familiar with the two theories. It is not a case of "either/or," rather, it is a case of "both/and."

There are many other aspects of the two theories where we believe further analysis and synthesis would be worthwhile. For example, both theorists addressed problems and issues pertinent to the educational institutions in which learning and teaching occur; both theorists commented on the epistemological and ethical aspects of their theorising. These topics are beyond the scope and aim of the current paper but may be addressed in future publications.

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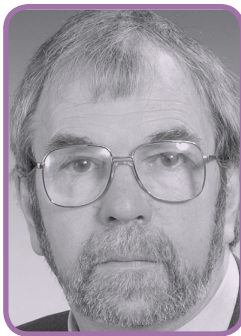
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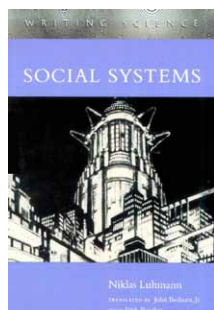
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