



And he was magic

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Abstract *Pask's great contribution to cybernetics is to take seriously the notion of interaction in the circular processes that lie at the heart of the subject. From his earliest days he worked with interactive systems. His master work, conversation theory, epitomises the interactive system, which he then extended and generalised into the interaction of actors theory. In this paper, the requirements that conversation places on our understanding of participants is presented in the form of a specification. In particular, the ways of behaving and the assumptions under which we have to behave if we are to be able to converse with success are expounded. These are in great contrast to neo-Darwinian assumptions. The difference between communication by code and communication by conversation is explored, and the primacy of conversational communication is argued. Finally, it is claimed that the ways of behaving and the assumptions that are the requirements for a conversation to take place are presented as personal qualities that were particularly apparent in Pask himself.*

Introduction: a wish list

This paper has two aims. The first is to emphasise the heart of Gordon Pask's contribution to cybernetics: his appreciation that cybernetics is concerned with interaction rather than action and reaction. To do this I set the stage by introducing my characterization of early cybernetic ideas and, in contrasting his ideas to these, develop the theme of interaction as a theme spanning his work by presenting what I see as his key underlying ideas and assumptions. In particular, I explore his notion of a conversational approach to communication, and indicate why I believe it has primacy over what I have characterized as a coding approach.

The second is to indicate what is required of the participants in an interaction, in terms of behaviours (I hesitate to call these participants actors, in the presence of de Zeeuw's (2001) generous paper in this volume concerning Pask's interaction of actors theory). In doing this, I hope and believe you will find that I am, curiously, painting a portrait of Pask.

I shall make extensive use of models that Pask, himself, rarely used. I justify this because I am giving my interpretation and I am showing it through models that helped and continue to help me develop my understanding of his work. As we shall see, it would be odd, indeed, if I were to stay entirely constricted by the Paskian universe. Nor do I believe Pask, the great adumbrator, would expect – or wish – this. But it is also true that many of those who might enjoy Pask consider his own metaphors and explanations “difficult”, whereas I want to show the key understandings are not so difficult and that, like all geniuses, Pask's insights are, at heart, profoundly simple. The response I would hope for should be “of course!”, not bafflement and bewilderment[1].

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Pask would refer to his occupation at any particular time in terms of the “hat” he was wearing. But I have no doubt that his favourite hat was the hat of the cybernetician, and it was in the field of cybernetics that he made his greatest contribution. It is therefore doubly appropriate to use his (approach to his) cybernetics to paint his portrait. Hat and all.

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An early insight

Cybernetics without Pask

When Pask began his work, at the start of the 1950s, cybernetics[2] was a very new subject. It was characterized by an interest in feedback as a means to control and self-control. The principle of feedback as then understood was dominated by thinking in terms of a kinetic model of a kinetic world, dominated by the concept of energy. That is to say the notion “feedback” was essentially a topic in a world of physics: the information passed was embodied (tellingly) in physical energy. Feedback involved taking a tiny[3] part of the energy of the output resulting from some action on a system to send back a message concerning the result of that action to the action’s instigator. Because the energy used to feed the signal back was so small, it was, according to the contemporary conventions of physics, ignorable. Thus, information could be transmitted with what was presumed to be no significant effect on the physics of a system.

The results of early understandings of feedback in physical systems was, therefore, the treatment of a system as a series of actions followed by consequent reactions. Pask was one of the first to realize (and to act on this realization) that feedback is a matter of form: that what is revolutionary in the circularity which feedback introduces is not a matter of energetics but of organization, of the form of the system (see, again, Wiener’s original formalisation (Wiener, 1948) and his later exposition in human terms (Wiener, 1950), and the *Proceedings of the Macy Conferences on Circular Causality* – see later). That is, when we consider systems in terms of information, we are considering them in terms of their form. Think of “in-form-ation”.

A typical, textbook example of a simple feedback system[4] in operation is found in the act of shooting. For simplicity’s sake (oh, that dangerous phrase!), let us consider the target as stationary, at a fixed position in space. A gunner shooting at it will often miss on first shot, for any number of reasons. If it is possible to see that the shot fired did miss, and by how much (in the simplest of terms: did it fall short or go too far, was it to the right or the left?), it is possible to modify the aiming of the gun so that the shot – all things being equal – will fall at another place, hopefully nearer the target. A process of continuous observation of where the shot landed leading to a modification in the aiming of the gun can lead to an eventual pinpoint – in the conventional account – shot that hits the target full on. The process we have used depends on feedback (feeding back to the gunner the information of where the shot landed relative to the target), and, speaking of form, completes the circle.

The question as to why the gun missed in the first instance is not considered important and, therefore, is of no concern. It is just accepted that the gun does miss (for any number of possible reasons which cybernetics does not normally explore). Error is ingrained, inherent in systems. To the best of my knowledge, cybernetics is the first systematic approach that does not treat error as innately bad but as inevitable and therefore to be accommodated, tolerated, built into the expectations, perhaps even enjoyed. Without error there would be no cybernetics. In effect, error is no longer seen as error: that is, the sense of the word error has changed (Glanville, 1977; 1995).

The eventual success of the shooting example above (when the target is hit) depends, ultimately, on our ability to make observations of what is happening, and to link these observations, using them to determine the performance of the system. Indeed, it is this ability that allows us to determine the system in the first place. We make observations of what we call behaviours, and we link the behaviours together and to the mechanism we conceive as generating these behaviours so that we have a clearly-defined, apparently causally behaving system. While physics may provide the mechanism of delivery and the energy required, cybernetics gives us both the notions that allow us to identify the system and the control that leads to us (eventually) hitting the target.

We should note the word “apparently”. There is no need for us to have any understanding of the notions of physics to aim and (eventually) hit the target. Indeed, we do not need to know anything at all about how the system “actually” works. All we need to know is that carrying out a particular action on a system modifies the result of that action in such a way that we can guide the action, in sequential iterations, towards the end we desire (the goal). The model of feedback used here allows us to attain our end without any particular (or verifiable) notion of what “actually” happens within our system – of its mechanism. The appropriateness, and hence rightness of this way of looking at things is asserted in practice: how many gunners fully understand the physics of their guns, or think about (need) the physics when shooting?

There is a model of the world which accommodates this. Ashby (1956), who claimed it might be argued that everything is a black box, attributed the origin of this concept to James Clerk Maxwell, although I have yet to find anyone who can trace the reference[5]. The black box is a way of saying we cannot know what goes on inside any system, we have only our descriptions of behaviours we set up and observe: and when we find regularities, it is in the behaviours of the black box *vis-à-vis* our observation and interpretation as and when we interact with it (Glanville, 1982)[6].

Notice the word “interact” in the previous paragraph[7]. The conventions of the feedback description discuss behaviour in terms of an action leading to (producing) a consequent reaction. But, when I introduce the black box model, I change from the vocabulary of action and reaction to that of interaction. What do I intend by this? To explain the difference I must contrast both concepts.

Action and reaction are characterized by a simple, supposedly causal connection. When, for instance, I click on an icon on my computer, I expect a

particular type of behaviour to result. I do this, that results, and so I do what comes next. In terms of shooting, I aim and fire, the shell lands and I report the proximity, compute the error and repeat the procedure, i.e. re-aim and fire again.

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There is a notion of directionality in action and reaction (and, indeed, cause). I cause the computer to behave in some way, through my actions: the computer does not cause my behaviour[8]. Furthermore, I expect an outcome that is unambiguous and entirely determined: that is, in any system, any one action produces a specific and associated behaviour/outcome.

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Everything is under control, the world is unambiguous and unproductive in the sense that it does not lead to the unexpected, and the control of behaviour both leads to and reinforces the belief in cause as the just account.

In contrast, interaction is productive and deals with the undetermined. In the case of the black box, the observer builds a so-called “functional description” of the behaviour of the black box (Glanville, 1982). But this functional description exists only between the black box and the observer, is only taken to be valid while and where in use, and is a description/account of the behaviour not of the black box (although we often forget this, claiming in simplification that it is), but of the black box and the observer together. This is what I mean to distinguish when I use the term interaction (in contrast to action and reaction). Interaction is between and occupies/occurs in a space between the participants (Glanville, 1997a). The functional description is an ephemeral, fleeting, transient determination of the way the observer and the black box behave together that maintains for my interaction with it, at this particular moment[9].

Directionality no longer holds. For example, if I am on the Internet, I get results that are surprising. And where I go and end up, what I choose to do, how I understand depends no longer on a sequence of actions and reactions, but on some process that works between the computer and me: which can properly be called interaction. It is not I that determines where we go. It is not the computer/Internet. It is our engagement together, our interaction, in the moment.

Interaction is an unconstrained product of both participants, is non-directional (i.e. circular), non-causal, without (eventual or ultimate) control. It requires a space of its own in which to happen (the interface). Whereas, in the case of action and reaction, the interface is, I have argued (Glanville, 1997a), on (the boundary surface of) the reactant.

The black box model gives us both a way of conceiving interaction, and a recognizable representation of something at the heart of our experience – that we do not know what is happening in the objects, processes and actions of our worlds (or indeed in how we discern these): we generally[10] act symbolically rather than through a knowledge of actual mechanism, even when we think as physicists. When we do believe we know, there are always further (but unasked) questions and acts of faith at hand, for we cannot observe beyond our observing (Glanville, 1999b).

These notions of action and reaction and interaction and circular causality were the major foci of the Macy Foundation meetings (McCulloch, 1955; Heims, 1994). Gregory Bateson, the dialogical pioneer, also has valuable insights on these topics (Bateson, 1987; Ruesch and Bateson, 1951).

Interactive Pask

In 1972, Gordon Pask wrote a blistering paper about the state of the art in computer-aided learning (Pask, 1972b). Part of the target of his bombastic attack was the trivialisation of learning that computer-aided learning (henceforth CAL and to include computer-supported learning, computer-mediated learning, etc.) had come to embody, as little more than an action-reaction button-pressing instructional activity which failed to take on board that learning is a constructive process occurring in the interaction between the learner and what is to be learnt (sometimes in the presence of a teacher).

This criticism still holds today, for all the hype of the majority of those offering CAL materials and of the computer industry, as they abuse such terms as “multi-media” and “interactive”. Saying something is multimedia and/or interactive does not make it so – unless we redefine the terms (as has been done), destroying the distinction they refer to and making them meaningless[7].

But this onslaught from the father of CAL should not have been unexpected. His complaint did not depend on some radical new insight, although its biting bitterness and forcefulness may have been caused in part by a feeling of parental betrayal by the acolytes and publicists. The truth of the matter is that Pask had been developing truly interactive machines from the very start, since the early 1950s[11]. Two projects bear out this claim. They are SAKI and MusiColour. SAKI is the easier to access.

SAKI is the acronym for Self Adaptive Keyboard Instructor. SAKI is a set of embodied understandings that have taken several forms. Originally, it appeared as a trainer for Hollerith card punch operators, eventually manufactured by Solatron. In more recent forms, the understandings it developed are to be found in many computer-based typing trainers such as Mavis Beacon Teaches Typing. I am not aware that any of these trainers have recognized Pask and McKinnon-Wood (who also produced their own typing trainer realization to run on the BBC computer). A fuller summary can be found in Pask (1982).

What SAKI does which is different from, for instance, the traditional Pitman method of typing training, is to modify in real time the exercises set the trainee. SAKI measures the learner’s mistakes not only in individual key depression, but also in key sequence: and it measures them both as mistakes and as stutter like hesitations in the stream of the action of typing on a keyboard (to use the currently more familiar example of a typing trainer). By observing the weaknesses, uncertainties and mistakes in the trainee’s performance, new exercises can be generated that redefine what the trainee is set to do, reflecting and compensating for these mistakes. Thus, the trainee’s behaviour changes the response of the trainer (program), and the trainer’s behaviour changes the

response of the trainee, with the result that previously completely unpredictable exercises are set and performed. This is the “self-adaptive” of the acronym. It is also interaction, in the sense intended in this paper.

MusiColour is harder to cite because it is more a matter of legend[12]. Records are poor and difficult to come by. It was a system that Pask and his friends toured in UK night clubs (a reminder of Pask’s theatricality). Long before the ubiquitous light show, Pask and McKinnon-Wood developed a light show that was and remains far more sophisticated. Its enticing feature was boredom. As with contemporary light shows, it sensed the sound made by the musicians it was working with and responded with lights that flashed in differing colours and rhythms. But it was also self-adaptive, and the driver for its self-adaptation was not error, but boredom. If it found itself driving its lights to flash in what it found to be the same manner for some time, it would, getting bored, change the flash-pattern by modifying the model it used to determine the flashing of the lights that it had built from the musicians’ sounds. The musicians, faced by ever more strange and unrelated patterns of lights, began to respond by changing how they played (so that MusiColour’s model would register change). Thus, boredom would drive a change, and the lights and musicians would come to perform as an ensemble, jointly fighting MusiColour’s boredom construction and the musicians’ wish for an audio-visual coherence. This was improvisation in which man and machine took part as synergetic equals. And there is little more interactive than true improvisation between jamming musicians.

Both these machines/systems are genuinely interactive and were (I would argue still are) years ahead of their time. And both exhibit and encourage learning: learning in the trainee typist, learning in the machine, and learning in the system of musician and machine coupled – the true indicator of interactivity.

Notice, also, that inasmuch as the machine is observing what the human does, it is observing within the system. Pask was dealing with observing systems (von Foerster *et al.*, 1973; Pask, 1996) rather than just the observed systems of traditional science. That is to say, Pask’s understandings even in those early days (and 20 years before von Foerster’s formulation) were of what we now call second order cybernetics.

Conversational Pask

Pask continued working with many intriguing ideas, such as chemical computers (Pask (1962a) extended in Cariani (1993)), especially in the field of computer aided learning which he had, in effect, founded. (I repeat that he was interested in and talked about learning rather than teaching, a difference still scarcely understood and acted upon today.)

By around 1970, he had begun to need to define and formulate a particular process (i.e. embodiment) of interaction.

The process that Pask chose was the conversation. Around this he built a vast, far-reaching, sophisticated and subtle-yet-complex theory, not extensively

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discussed in this paper[13]. The account I give is not historical, but a post-rationalization intended to explain. What is covered is those basic mechanisms of the conversation (as held in the procedures of conversation theory) which demonstrate the interactive nature of the theory.

One way of introducing conversation theory is to revisit the notion of the black box. When we consider something as a black box, we are talking about not knowing what is inside it – how it works. By definition, we do not, and although we can “whiten” the black box, we do so through an interaction in which we build a description. We do not open the box; indeed, we cannot. What is inside the box remains a mystery. The description is always tentative. What is talked of as “whiteness” is not a truth, in the old sense (Glanville, 1982).

It is the same when any of us talks with other people. We never know what they are thinking, but we construct our own understanding of how we think they think, and act accordingly. Often, but certainly not always, our understanding works well, whether because we are correct or because the other chooses to act in the manner they believe we expect. But we often find ourselves surprised by each other. The black box mechanism not only protects the privacy of what makes us each different from every other, but also allows for (demands) the introduction (through that difference) of what might be thought of as synergetic novelty: that is, each brings differences in understandings such that the conversation goes into areas belonging to neither, yet claimed by both!

It is a central tenet of conversation theory that we do not have the same understandings as each other: that each of us understands in our his/her manner, and not in the manner of any other.

Thus, each of us may be taken to be a black box to the other. Through interaction, I build my “mental picture” of you, including my belief that you exist, what I think you know and how I judge that you respond – the “functional description” of the black box model resulting from our interaction. And you (I must presume (see Glanville, 1990)) do the same of me.

A Paskian conversation is based in such everyday conversational experiences. In its simplest and most literal form, there must be at least two conversants. One, having some understanding (meaning) will present this in a space (which Pask called a “conversational domain”, or, wearing his educational mortarboard, “subject matter” (Pask and Scott, 1973)) constructed and shared by and between them, by some means, such as spoken language (Pask *et al.*, 1973; 1975). Through this presentation – which is not, of course, the understanding – the second conversant creates his/her own understanding (of the first conversant’s understanding) and then presents it back to the first. In turn, the first creates his/her own understanding from the presentation (of the second conversant’s understanding of the presentation (of the first conversant’s understanding)). This is compared with the original understanding the first conversant wished to communicate. If they are congruent, the first conversant may assume that (s)he has communicated with the second so that the second has built an understanding which is that conversant’s equivalent of his/her

own in how it has been presented back to him/her[14]. If not, the process is repeated in order to attempt to overcome the error, or we give up (“agree to disagree”, as Pask would have it)[15].

It is unfortunate, but necessary, that the description be stated in this long-winded manner. Unfortunate, because (as with the rules of a game) something which is essentially simple and intuitive appears insufferably complicated. Necessary, because a simplifying distortion of this conversational communication has been developed and passed into general use: we have come to assume we communicate understandings directly, and that the means of presentation (e.g. words) have (repeatable) meanings of their own and in themselves, so that what you understand and what I understand may legitimately be taken to be the same – at all times. In the extreme, the image is of the same little homunculus or pattern of neuronal signals or images or whatever, uniformly causally linked, which reside in each of our brains.

It is crucial that the presentation back in the circular process of conversation, which indicates and embodies the building of individual understandings by each participant which may be taken by the others to be effectively the equivalent of their own, does not (to use the example of words) use the same words as the original presentation, otherwise all we know is that imitation has taken place, rather than an understanding developed[16].

Clarification of the characteristics of the space between (in which the conversation can occur), of how it can be established as an artifact of conversation and of how the conversation can be directed and sustained have all been tackled; as has the structure of the conversational domain, testing understandings and their communication, learning and conversational strategies; and how we can simplify and speed up the conversational process so it is less long-winded (as with natural language; see Glanville, 1996a), to list but a few. Pask (and others) have done volumes of work on such matters (Pask, 1971a; 1971b; 1972a; 1975a; 1975b; 1975c; 1976a; 1979; 1980; Pask *et al.*, 1973). But what is central in this paper is the method of conversing. Circular and productive, it is richly interactive and capable of generative behaviour (see the Barnes (2001) paper in this issue).

Interaction is a product of the involvement of both participants, non-directional (i.e. circular), non-causal, without (eventual or ultimate) control, and requiring a space of its own in which to occur – the interface which I have described as the space between (Glanville; 1997b; 1999a). (The interface, in contrast, is not a space but is on the reactant, in the case of action and reaction.) Conversation, as Pask intended it, satisfies these criteria. Conversation is, indeed, an interactive process. For Pask, I believe, it was *the* interactive process: and I agree. Conversation is so central in our existence that it is perhaps the most blatant and also the most exact example of interaction. If this seems in doubt, consider what happens with people who deny or withdraw from interaction by withholding conversation (e.g. through senile dementia or autism): we look to find meaningful interaction with such people by wishfully interpreting small signs as indicating understanding (she recognized me). We

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do the same with devices that vacuously mirror our statements, looking for significant meaning: consider our reaction to Eliza (it is so clever), and with animals such as performing seals (oh, look, how sweet, it's crying).

Having developed the notion of formal conversation, Pask became concerned with two questions that reflect limitations:

- (1) How to hold a “conversation without end, transcending the individuals and the time and place in which a conversation resides” (as he put it to me). To overcome this limitation – that particular conversations must and do begin and end – was, he told me, the major aim for his interaction of actors theory (see de Zeeuw (2001), who, however, largely concentrates on different features, and Pask and de Zeeuw (1991)).
- (2) How to expand a conversational domain (which may, of course, originate as empty), which is the concern of the proto-language (or-logic) he called “L_p”, which he devised to lie behind his conversational procedures[17].

These are both clearly concerned with interaction, and I will not further pursue them here.

I trust I have now shown that, from his earliest days, Pask was consistently concerned with a cybernetics of interaction, rather than of action and reaction. And that, in conversation theory, we have a profound statement and formalization of this concern.

The primacy of conversation

There is a popular view that the world is (rather than is like) mechanism, and communication is a code.

However, in order to know something is a code, let alone to code or uncode its encodement, we have to negotiate that it is a code. Even in a world with encodement built in, the fact that it is encoded needs to be established: and code type activities do not permit that you should know this within their systems (Goedel, 1931). If code is taken as given, then it is an article of faith, a construction and an artifact of belief. Yet even in conventional terms (which Pask and others set out to challenge), we would concede that we live different lives formed by different measures of influence of differing factors. Even where the response to a code is modelled as causally determined (e.g. in celestial mechanics and stimulus-response psychology), to understand that it is a causal code (and hence to express code as an artifact of knowledge) requires that we step outside coding in order to say (negotiate) that what we have is code. And this is without even considering the matter of understanding.

Codings, and the properties associated with them, are constructs negotiated between people and other supposedly intelligent objects/processors. Extreme realists, genetic determinists, congregators and High Priests at the Church of the Latter Day Darwinians (such as Richard Dworkins) and others who claim to speak, without sentiment, of facts and mechanisms entirely miss the point. But this is not surprising: they trap themselves (as they try to trap others, often

using quite disgraceful tactics) within the limits of their encodements (following a brief venture outside these limits to determine them). They restrict to what they want to think and know. They do not apply Occam's Razor to their beliefs, placing them above such considerations. Self-righteously, they hold their truths as both secret and self-evident, beyond questioning, as do many other High Priests.

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Conversation is a "more fundamental" model of communication than the encodement model used in dictionaries and further enshrined in Shannon and Weaver's (1949) notion of "information", and similar encodement models. The properties required for success in an encodement model are not the qualities required in a conversational model. Rather, the qualities required in a conversational model are prior necessities for the setting up of an encodement model.

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Put another way, the encodement model is a highly specialized, limited restriction of the conversational model (as Newton's mechanisms are of Einstein's model). Occam at work!

My gift of thanks

I am not aware that any attempt has been made to explicitly elaborate the qualities necessary so that a conversation may function. But, having argued that Pask was consistently concerned with interaction throughout his working life, and that conversation is both the idealized and the essential embodiment of interaction, "more fundamental" than coding, I take it upon myself, as my gift of thanks to Gordon, to take a first shot at this. This is the fulfilment of an important aspect of a great humanist undertaking, reflecting a belief that our consciousness is not restricted to the mechanisms of our descriptions, and, as such, is at the heart of Gordon's passion. To create such a scheme is, I believe, the greatest tribute I can pay to his understanding, his insight, his work and his imagining. It also throws light on us, as people: on our behaviour and our inspiration, and on the ethics that were always behind Gordon's work but which (as with other "philosophical" issues) he seemed so reluctant to put into an explicit written form (for a discussion, see Pask, 1963; 1980).

Let me start by writing a short summarising essay. What follows in this section is more in the form of a specification with explanatory notes: a specification that is a first stab at determining just what is needed if we want to make a conversation work, rather than a specification of the workings of the mechanism of conversation, which is what Pask undertook and formulated in great detail.

We cannot, for instance, join in a conversation unless we are actually "willing" to take part and are prepared to allow that the other conversant has his/her own, distinct point of view that we will respect (and, indeed, that there is at least one other participant). The whole point of the conversation is that this distinction exists, is recognised and maintained. But to recognise and maintain the distinction requires, in the first place, an ability to listen – not to hear the surface of the words, but to listen carefully, honestly and creatively so

as to construct a fair and generous understanding of what the other is saying in using those words; that is, to create our own understanding of what the other presents to us (of his/her understanding) (for a discussion of the importance of listening, see Glanville, 1999c).

This act of listening is firmly based in generosity (and trust). To give space for the other to speak, to listen with care (remember, care has the root *caritas*, also the root of charity), is a most generous act of temporary selflessness. It requires an open mind, giving up control (of the other and of the conversation) and, therefore, a willingness to be surprised and to discover the new – which comes from the necessary differences in our understandings, leading, perhaps, to the development of a notion of “the conservation of distinction”, which, in turn, might be seen as another way of describing the necessary respect for the other in the conversation.

This generosity also holds in the mechanism of presentation. Since our words and our thoughts cannot be the same (if they were, one would not be able to stand for the other, the essence of the act of presentation (Glanville, 1980)), we have to think our way beyond the words of (re-)presentation, for meaning does not lie in them, but in each of us. This “looking beyond” is also generous, and allowing that the linking of words to thoughts is personal, it is necessarily imprecise. This also requires honesty.

Equally, we need a form of memory, if we wish to converse. Not the general memory we would argue for concepts, but a less ambitious memory that allows me (as a participant) to remember what I was trying to communicate while constructing my co-conversationalist’s presentation of his/her understanding of mine, etc., so I can compare the two to make sure I can believe I was well understood. (This is a constituent of conversational levels.) In turn, I must be willing to make my own understanding through listening well and learning to construct my own understanding. This involves my imagination.

The new can only occur when I go with the conversation, allowing it to take me with it, respecting it as I respect the other participants, and remaining open to what it makes possible/brings to my attention. When I close down my open-mindedness, I close down the conversation. To go with the conversation is another matter of trust. I have to be willing to go along rather than fearing that I might be lost or somehow hurt.

Specification: what is required so that a conversation may happen?

In order for a (strict, Paskian) conversation to occur, there are at least two types of (pre-)condition or quality that must be fulfilled (the requirements)[18]. These are the operational requirements (what is required for the mechanism of conversation to work); and the inspirational[19] requirements (what is required of the attitude of the participant conversants, in order that a conversation may have a chance of occurring and of being successful. I present these as a series of bullet points with commentaries, almost as a specification or schedule. While this lacks fluency, I hope it keeps the points clear. This may help us follow Pask in both senses.

Operational requirements for a conversation

The operational requirements for a conversation (see Glanville, 1993) are:

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- (1) A willingness to take part in a conversation (about some topic). Otherwise there will be no participating conversants (and at least two are needed).
- (2) A (negotiable and, usually, shifting) topic around which the conversation takes place. Otherwise we are not talking about anything (in particular). Of course, the topic of the conversation may be “what shall we talk about?” Thus the ever-present background topic is the reflexive topic “what topic?”
- (3) The creation of different understandings in all participants. This is the condition that defines the need for a conversation. If we were all to understand the same, we might be able to encode messages, and universality of a kind might be achieved at the expense of the existence of individuality, and, I believe, understanding (you do not need understanding when there is a code at work: this is the basis of military and quasi-military “programming” of recruits to obey orders in such a manner that there is no ambiguity of action. Think of the catch phrase of the type “Understand? Understand! You don’t need to bloody understand, just bloody do it!” roared by endless filmic sergeant majors.
- (4) The statement of these understandings through acts of presentation. That is, we attempt to present what we understand so that others, finding themselves in the presence of our presentation (and willing to involve themselves with it), can construct their own understandings from that presentation. This act is commonly called (re-)presentation. As explained earlier, the term presentation is preferred (for a simple exploration of the mechanics of conventional presentation, see Glanville, 1975; 1980; n.d.).
- (5) An ability to compare understandings: my understanding with my understanding of your understanding (of my (initial) understanding). Behind this requirement lie two sub-requirements. Assuming that we are living in a temporal universe, there are the requirements of memory and of comparison. We cannot compare events occurring in a temporal sequence without at least a primitive (storage) form of memory. Unless we can compare the (original) understanding we started with to the (later) understanding we build of our conversational partner’s understanding (of our understanding), we cannot determine whether to believe our partner has understood us. Pask explicitly recognized this in the reflexive work of Laing *et al.* (1966), although Barnes (personal communication) insists that Bateson has priority, and Scott (personal communication) also insists Pask was fully aware of these metaperspectives before Laing published, as can, for instance be seen in his (Pask’s) drawings.

- (6) A structure of three co-locational and con-temporary levels: the level of the conversation, the level (sub-stratum) of the topic, and the level (meta-conversation) of error correction. These requirements were a matter of dispute between Pask and myself. He maintained the three levels implicit here, and the switching between them, were not necessary: they are accommodated within the (solitary) main level of the conversation itself. I maintain that, without these levels, error correction is an entirely haphazard process and has no realistic chance of effective success. There is a need to know what the conversation is about, and to evaluate and criticise the conversation's progress, as well as to be involved in holding it. Actually, the sub-stratum is, in effect, the second requirement in this list – a (negotiable and, usually, shifting) topic around which the conversation takes place (Glanville, 1996a; Glanville and Pedretti, 1980). Harri-Augstein and Thomas (1991), whose originality and contribution in the development of conversational notions should be acknowledged, cannot, unfortunately, be explored here. They discuss metacommentaries in higher levels of learning conversations.
- (7) An ability to monitor what is going on and to correct for incompatibilities between understandings by switching levels, i.e.:
- being able to switch to a meta-conversation, which allows for misunderstandings to become (for the moment) the topic of the conversation; or
 - reconsidering the topic of the conversation itself (the sub-stratum).
- This keeps the process of negotiation – i.e. the mechanism of conversation in use to reduce differences – constant regardless of the level at which the negotiation is taking place. Even those who favour encodement models of communication talk of this type of recursion, calling it “self-similarity”.
- (8) A way of initiating and terminating the conversation: that is, of slicing the continuum of time. In Paskian terminology, a concept is of an understanding and is a unitary occasion that indicates “points in a conversation” (essentially, this is the mechanism of Saussurian (re-)presentation, where that which is represented and that which represents it function by being synchronised together by co-inciding in the same span of time sliced within the continuum (de Saussure, 1966)). In CASTE (Pask and Scott, 1973), Pask talked of the role of the system as a cloud chamber for observing understandings, i.e. unitary occasions.

We agree. Or we agree (to disagree). As Pask says.

Note that it is not necessary in practice to confirm each understanding, turn and turn about. The conventional correction loop need not occur for each and every utterance. Nor, given that participants have joined the same natural language “club,” do we need to negotiate every meaning (Glanville, 1996a). In

other words, we develop short cuts. But these refine the picture in practice, rather than negating it in principle. However, there is a price to pay for these short cuts, which includes inadvertent communication pathologies where everyone thinks everyone else knows what is going on when, in fact, they do not (Scott, 1997).

And he was
magic

Inspirational requirements for a conversation

The inspirational requirements for a conversation are:

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- Recognition that the other has, by definition, a different understanding and a different way of (re-)presenting this understanding. This is the basic epistemological position of conversation theory, and is a necessary condition for interaction to be possible. If there is no difference, there is no need for us to develop our own understandings and there is no basis for the new. The world is uniform, and we all agree about everything, we would not need to exert the effort to learn, but could simply be told (instructed): the message would go directly to our brains, or whatever it would be we would use for mentation, or messy notions such as understanding. But we neither find this, nor can we argue it logically. This point is, of course, similar to the third point in the previous section.
- Respect for this difference and for the owner of the difference. For true conversation, we must respect differences. Respect is the way we understand and form (give expression to) individuality. Respect also asserts that I am not you.
- Willingness to listen to and to hear the other. Otherwise we are not respecting the differences, nor are we able to discover and use them.
- Willingness to make my own understanding of what the other presents to me. This is how I respect myself, my individuality and my difference.
- Willingness not to try to force my view on the other. It is easy, especially in power relationships, to act to deny or to act against difference and (try to) impose our own view. This destroys the actuality and benefit of conversation. It is also, sadly, all too common.
- An open mind: that is, a willingness to understand and to negotiate, to make room for the other. Unless we have an open mind, we cannot listen to others and we risk forcing our views onto them, thus destroying conversation.
- Opportunism: to look for opportunity and to see “the good”. We need to assume a mind set that sees the surprises that occur in conversation, and in what our conversation partners offer, as beneficial. These surprises are the natural outcome of a conversational process, and therefore inevitable. Since we cannot, in principle, avoid them, we might learn to welcome them, as we might learn to see these situations as “good”. To do otherwise is foolish!

- Willingness to change, develop, improve: that is, to learn. In other words, to assume the benefits of conversation, to live by and through them: both in conversation and in life. This is learning.
- Recognition that what happens in a conversation is not the property of the different individual participants, but of all of them together. Otherwise we fail to recognize that conversation has a life of its own. And we also run the risk of undermining the openness and co-operation that conversation (and interaction) both afford and demand.
- Willingness to go with the conversation: that is, to find the unexpected. Conversations have lives of their own. This is the nature of interaction. Each participant contributes, but the conversation, nevertheless, has a life of its own: it is also an individual and a participant. This is how we find novelty in and through conversation. If we do not go with the conversation, we negate its extra value, i.e. the benefit not that we make our own understandings, but that we can go beyond (transcend) ourselves and our own limitations.

These qualities may be thought of as aspects of forms of presentation of certain centrally human qualities.

A portrait of Pask

It is in these requirements, especially the second set, that the person of Gordon Pask appears. And, as it happens, these are qualities that we think of as decent, good, desirable (essentially human), leading to a life of quality – that is, they are spiritual (in the non-religious sense of the word). I can only guess why an analysis of the requirements for a conversation to occur should produce a portrait (albeit a slanted one) of the progenitor of conversation theory, or why the two should fit together so well. It may be simple coincidence. I would like to think otherwise.

What, then, are these qualities? They lie behind the requirements listed above, for without them I, at least, find it hard to imagine how these requirements might be attained. Let me explore this.

There are two groups of qualities. The first has to do with generosity, the second with openness. (Of course, these two are themselves related in trust: how can you be generous without being open, or open without being generous? And how can you be either without trust? (Glanville, n.d.))

Generosity is needed in granting that there is another, in the first place, and in giving space for that other to understand in his/her own way, rather than trying to impose one's own understanding: that is, for there to be a conversation at all. Generosity is also needed to make one's own understand of the other's understanding, to see what they mean and not to cut them off because they don't agree with you. Thus we show respect: for the other, and for the other's contribution to the conversation (including the necessity that the other participates in order that there may be any conversation at all). This respect requires honesty. Honesty in recognizing the other, in motivating in the

act of conversing, and in both accepting the other's views and presenting one's own.

Together, these form the basis of a conversation with beginning, end, and a passage between: a shared event brought to conclusion, with the power, nevertheless, to drive itself. This is the drama of conversation.

Openness is required that one conversationalist may enjoy what another offers, and the discovery of the unexpected, the new. Openness is necessary to allow the other to have an understanding and to try to hear it without prejudice (i.e. in a manner that allows the other's understanding of the space to be understood by the self). Openness is the opposite of censorship, of the attempt to force one's own views onto others. And, in order to create one's own understanding of another's understanding, imagination is needed. Indeed, imagination is needed to see that this is possible and advantageous, and to appreciate benefit from the discovery of the unexpected, the new (i.e. opportunism). In turn, this requires wit. Not wit in the recent, limited sense of cleverness, brilliance and sharpness (although they may be included), but in the older sense of wit as the seat of consciousness, thought, reasoning, imagination etc. (see the *Concise Oxford English Dictionary*). It also requires curiosity: the willingness to look and to wonder, to leave one's personal universe open so that what may be offered can be seized (opportunism again).

To summarise, these qualities are:

- generosity, respect, honesty and drama;
- openness, imagination, opportunism and wit.

And these are qualities that I associate with and see in Gordon Pask, the person, my teacher.

This is magic. Not magic as trickery or deceit, but magic in the unravelling and enjoyment of mysteries and the growing and maintaining of wonder, a deep understanding of the miracle of our existing in our differing worlds and of their coming together in conversation through their beginnings and ends. Of the poetic nature of our existence and of the unity of the void, the nothingness in and through which we dwell. And the love that is necessary that we can converse and (inter-)act with those others with whom we dwell, fairly and doing justice to them and to ourselves[20].

Some will argue that Pask had other qualities than those indicated above, and, maybe, that these qualities are more important than those I have mentioned[21]. I would not doubt there are other qualities, and could suggest several: for no portrait is complete. Each differs, as our understandings do. All I can attempt is to tell you of this understanding of mine, that you may form your own understanding. And I do believe this is a characterization which those who knew Gordon will recognize as containing many of the nicest personal qualities he had or aspired to. I find that the qualities that are mentioned when people talk of him are these same qualities.

His work, in intention, also shared these qualities in its goal and its actuality (Pask, 1980). One day, I believe, we will be able to see this.

And he was
magic

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What is the most important of these qualities?
Of course, Gordon was consummately interactive, wondering, kind, dramatic and loving. But these qualities, no matter how important, are not the most important.
He was all of these.
And he was magic[22].

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Notes

1. It is, I trust, easier and less presumptuous for me to do this than for many. I was among those students in whose presence Pask rehearsed the developing notions of conversation theory. Thus, I not only had a ringside seat but also saw the gradual refinement of confusion and barely perceived understandings, participating in their development through questioning, brainstorming etc. At this stage in his life, Pask would speak with a great clarity and sense of historical involvement not always clear in his writings. To have heard the man at this stage, regularly and openly, was a treat sadly few were privileged to enjoy. It was this experience, more than anything, which made me believe in the value of cybernetics.
2. Wiener (1948) defined cybernetics as "Communication and control in the animal and the machine".
3. Therefore taken to be insignificant – a word that later, in studies of chaos, we have come to see as dangerously and profoundly inappropriate.
4. And one that helped inspire the conception of cybernetics.
5. Most sources refer back to Maxwell's Demon. The Demon may or may not inhabit a black box. The Demon should be considered, however, a postulated mechanism if it is within the black box. But I have shown that what is inside the black box – indeed, whether there is anything there or even an inside at all – is something we cannot determine. We make a "functional description" (the postulated mechanism) through interaction with the black box. But we can never look inside (and if we think we do, "whitening" the black box, we merely make another black box). This is, in actuality, what gives the black box concept its power (see Glanville, 1982).
6. When Ashby asserts that the black box may be a model of (for?) everything, this means that we cannot know anything about how any "actual" system works – a Wittgensteinian assertion if ever there was one. I take as my position Ashby's speculation.
7. My (somewhat old-fashioned) use of the term interact is in stark contrast to the use in multi-media, computer games, etc. to mean multiple choice in an essentially deterministic (though potentially complex) world dominated by menus of items typically arranged in logical trees (see later in this paper for further discussion).
8. This is perhaps also due to the dominance of physical notions at the time of the early formulations of cybernetics, particularly the notion of energy. The direction of cause is taken to be the direction of energy amplification: in the terms of conventional, linear control, a small amount of energy in the control signal is amplified to a big expenditure of energy by the controlled system. This suggestion was made to me by a member of the audience when I lectured at the Free University in Brussels in March 1999. I am grateful to this unnamed colleague for providing this excellent clarification.
9. The concept of "moment" (and event) I am working with is most strongly paralleled by Karlheinz Stockhausen's earlier musical development of "moment form". This is a way of organising sound in music as blocks of sounds (moments) which may be re-ordered and overlap in various ways (this is why many of Stockhausen's pieces have versions which sound, although related, quite different).
10. I would prefer to claim always, but caution prevails.

11. With his partner Robin McKinnon-Wood (see Glanville and McKinnon-Wood, 1996; Glanville, 1996b). Pask's wife, Elizabeth, was also involved in SAKI, developing the initial "seed" exercises and ways in which they might be developed.
12. However, Paul Pangaro, in his generously assembled Pask archive, has both artifacts and records.
13. The authoritative texts are, perhaps, Pask's (1975b; 1975c; 1976a) great books on conversation theory. However, the work was first published in a series of seminal papers in this journal (under its earlier title) (see Pask, 1972a; Pask and Scott, 1973; Pask *et al.*, 1973; 1975).
14. For a relatively brief account see Glanville (1996a) and Glanville and Pedretti (1980).
15. As von Foerster has pointed out (personal communication), since we cannot assume we are presenting the same thing again, (re-)presentation is an inappropriate term. Hence the use of the term presentation in its place.
16. However, Graham Barnes (personal communication) points out that there is a "conversational" or "dialogical" tradition which requires that the repetition back to the original speaker uses exactly the same words. I think the difference is that Pask is talking about developing concepts, whereas Barnes is concerned when concepts have been formed and polished, and when the intention is to develop listening skills. Apart from his own work, Barnes refers particularly to the work of Prince (1970). I believe this work follows a somewhat different position and that one of Barnes' (1994) contributions is to try to bring them together.
17. Interaction of actors theory and L_p are rather difficult to approach. In part, this is due to the demands that Pask placed upon himself. In part, he did not write much about them of more than anecdotal substance other than material probably best thought of as sketching, developing or working through by means of something akin to stream of consciousness. In part, because he was no longer in the best of mental, physical or emotional health when he undertook to deal with these immense problems. His powers, though considerable, were (I believe) no longer what they had been at his peak (nevertheless, see Pask, 1996; Pask and de Zeeuw, 1991).
18. This is without even considering that we are all different, and therefore that any supposed universality of meaning transmitted through coding presents precisely those difficulties already indicated.
19. Other than my presentation at the Pask commemorative day, on which this paper is based. Of course they are implicit, and occur, in Pask's own texts (e.g. Pask, 1971b; 1975a; 1975b; 1975c; 1976a; 1979; 1980).
20. I would argue that these also have to be present in an everyday conversation, but I prefer not to cloud the issue here by talking of less "pure" situations.
21. I previously used, and was unhappy with, the word motivational. Inspirational is an improvement, but I am still looking for the ideal word!
22. It was Gordon who insisted on the title of Graham Barnes' (1994) collection of essays *Justice, Love and Wisdom*. Love was, to him, a sacred concept.

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