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A Memetic Analysis of Policy Making*

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Abstract

A memetic framework is presented for the analysis of policy making. This framework is based on three concepts from modern biological evolutionary theory: interaction, replication and lineage. The framework consists of a view where descriptions of actions and people endorsing them, compete to get these action proposals into policy plans. This framework enables the inclusion of rational, non-rational and other selection forces, having their effects when choices are made. Because it also deals with the historical legacy of the ideas used to formulate a policy, it expands on the concept of 'bounded rationality', limiting the role of rationality or reasoning in making choices even further. It is argued that the degree of replication, versus rational or intentional deliberation in memetic evolution can yield interesting hypotheses. `Weaseling', a mechanism for memetic variation production, is introduced as a new difference between genetic and memetic evolution. Levels of retention are introduced as differences in success criteria for memes.

Keywords: Evolution; Policy Making; Meme; University; Organization; Selection;

1. Introduction

This paper aims at establishing a memetic framework of definitions with which policy making in public and private organizations can be described and studied. We argue that the framework is useful because it systematically uses the language of the evolutionary paradigm. In doing so, this paper connects memetic theory with theory about public policy, and so establishes a link between biological evolutionary theory and theory of public policy.

The framework establishes a view of public policy processes that puts the importance of `conscious' and intentional reasoning into perspective. As Price rightly (1995) [23] points out `Companies are not only systems created and controlled by those who manage them but... an organization can be seen as a product of .... the meme'. This view is taken up and elaborated upon by considering policy processes to be memetic selective processes[9]. Rational, non-rational and other selective forces are looked upon as possible explanations in policy making. It is argued that the memetic view presented establishes an elaboration on and is complementary to the widely accepted concept of `bounded rationality'[1] (Simon, 1976) [26].

Much has been written on memetics. However, clarity of definitions and a clear reference to specific cases are not often part of what has been written. For instance Price (1995) [23], while writing about `organizational memetics', comes up with very few definitions, and when he does they are vaguely defined while their usefulness is sometimes doubtful (he defines meme as `mental model' for instance). Other confusions arise when levels of retention are not distinguished (see section 2.4).

The authors feel that clarity of reasoning is dependent on clarity of definitions, and that considerable progress in memetic theory can be achieved by this. While assessing the plausibility of (hypo) theses and the review of different mechanisms are important to progress in theory, it depends on defining clear concepts. Hypotheses must be conceived first, and can only be meaningful if underlying concepts are clearly defined. One example in biological evolutionary might be the `levels of selection' debate which was at least partly resolved by discerning replication from interaction (Grene, 1989) [12]. We argue that, in memetics, concepts are often still unnecessarily ambiguous and that thus the establishment of clear definitions is important.

Therefore this paper aims at providing such definitions in the form of a framework upon which further research can be done, pointing out difficulties where they arise.

The definitions are based upon modern biological evolutionary theory according to Dawkins forthcoming a, b) [27]. Policy processes are viewed as memetic evolutionary processes. Memes are `pieces of data that are copied from individual to individual without too much alteration'. In fact, memes can range from simple ideas (or concepts), to complicated ways of interpretation, moral standards, conclusions from previous debates, and so forth.

In processes of policy making different views on how issues should be addressed compete for supremacy. Common for theories on policy processes is to assume that individuals and groups, usually referred to as actors, interact on the basis of different views and convictions, with a policy plan as a possible result. Problems and solutions (or elements of both) are tied to specific actors. Actors as well as problems and solutions compete for recognition in policy plans. Such policy plans, built on concepts, facts, opinions, and other memes, always contain plans to change (an) organization. No matter how

different actors think, eventually policy plans are produced, even if it should only be a `steady as you go' policy. Therefore, the study of policy processes is a good area of knowledge to study questions on how memetic evolution works, and how it is to be described.

In this paper we first introduce the framework and its conceptual building blocks In the description of lineages a mechanism for variation production (weaseling) is introduced, along with social mechanisms which can prevent this (concept-locking mechanisms).

A case study at a Dutch University is continuously used to illustrate the framework. In this case study the question is raised as to what the `democratic qualities of the administration of the university' are. The following conclusions argue that the view established by the framework is both an elaboration on current policy theory and a connection between biological theories and theories on public policy. After the references a list of definitions is presented.

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2. The Framework

2.1 The institutional system and the case study

In this paper we will refer to the case study `University of Nijmegen', or KUN (after the Dutch name `Katholieke Universiteit Nijmegen') to illustrate the framework.

After three years of debate the University of Nijmegen in the Netherlands carried through (in 1993) a major change in its regulations. The regulations were changed to what members in the University Council regarded as being 'less democratic'. The University Executive Board, however, saw this change as an important and necessary step forward to the future where `the competition will become more difficult'.

This three-year-debate included over 80 documents which we used as data. In the end it resulted in three changes in the regulations. Two major policy proposals were put forward, but only a few of the points in these proposals were finally included in the regulations.

The policy making process at the University of Nijmegen, and in fact all such processes, do not take place in a void, but in an administrative structure which can be described by means of institutions. Institutions are rules stipulating which specific actors have the power to make decisions, to write down policy proposals, and to influence for instance decision makers with their knowledge of, or power elsewhere in the organization, etc.

These rules can be laid down in laws and regulations. Nevertheless, such rules are often only part of the organizational culture: they are not written down at all.

Policy plans are formulated and approved of in such an institutional system. The institutions determine where some of the conceptual building blocks of the framework are situated in a policy-making process. Therefore we will briefly go into the institutional structure of the University of Nijmegen.

We will restrict ourselves to examples concerned with the central institutional structure relevant to the changes in the university regulations (in Dutch `structuurreglement') made in 1993.

The University of Nijmegen has three central organs: the `KUN Foundation', the University Executive Board and the University Council (from now on referred to as Foundation, Board and Council). The

Foundation is the legal owner of the land and buildings, appoints the members of the Board, and can set new regulations. The members of the Foundation are appointed by the convention of bishops of the province of the Dutch Roman Catholic Church. The Board is appointed by the Foundation, except for the Rector who is appointed by the Council of Deans (chairmen of faculty [2] boards). The Council is elected by and from students and personnel. Members of the Board are not appointed without `hearing' the Council and the other members of the Board. Before changing the `structure regulations'[3] (from now on referred to as `regulations') the Foundation must `hear' the Board and Council. We will expand on the history of the democratic institutions of Dutch universities later on in section 2.5.

The institutional system so far had to do with formal written rules. A good example of cultural rules was the behaviour of the Foundation. It did not impose new regulations, but left it to the Board and Council to make the decision to change the regulations if necessary, and if so, to formulate a proposal. After the Foundation posed the first questions whether and how the regulations should be changed, the Board and Council needed three years to formulate a proposal that gained support from both.

Besides the decision makers, there were also other relevant actors: for instance one of the two major policy proposals was formulated by a committee appointed by the Board, the other one was formulated by the civil servants of the `Bureau of the University'.

2.2 Concepts for policy making.

In institutional systems, as described for our case study above, policy plans are formulated from time to time. To consistently describe this process, we have need to introduce a number of concepts. These are memes, replication and retention systems; interaction, arenas and their selective environment; and lineages.

Policy making always takes place in (a group of) arenas where it is decided what memes (ideas, actions and such) end in a policy plan. In these arenas ideas come and go and compete for a place in the minds of people and, in the end, for a place in the policy plan. We will now describe the concepts more precisely.

2.3 Memes, replication and retention systems.

The `meme' is one of the most central concepts in evolutionary policy processes. It is defined as a replicator: `a piece of data that is copied from individual to individual without too much alteration' (However, we will argue in the next section that a meme can also be an interactor.) In an evolutionary framework a meme is a replicator, a term that was first used for genes (Dawkins, 1976) [8].

In human cognitive processes it is quite common that ideas, normative criteria and other entities are copied from individual to individual. When we hear an argument why a specification should be taken, we might remember it and repeat it to others, or incorporate it in a proposal for a policy plan. Ideas thus transmitted from individual to individual, or from report to report, are called replicators. The acts in which this transmission takes place are called replications. A replicator contains data or, in other words, has a `coded structure' which stands for something else. Such replicators are called `memes' when the replication system is the brain[4]. Memes may be ideas, but also ways of thought, complete models of how (parts of) our world works (theories), examples or metaphors to explain things, and so on. Just as genes, memes are replicators, be it in a very different replication environment and process. Likewise, memes may contain data which becomes information when interpreted by an interpretation environment. While the interpretation system of genes is always of the same kind (Ribosomes and so on), interpretation systems of memes usually differ ('democracy' may mean different things to different people and in different contexts).

When replicators are not replicated, they are stored in retention systems or memory. As to genes this is almost always cellular DNA, but memes can be stored in many kinds of retention systems. Books, brains, tapes, and computer memories are possible meme storages.

In the case of the University of Nijmegen several `new' memes could be identified. They first surfaced in the second proposal for the policy plan written by the committee `Zeevalking' (Second report Commissie Zeevalking, 1991) [6]. The committee was appointed by the Board while Zeevalking was the name of the chairman of the committee. In this report external factors are described which `have an influence on the university'. Examples of these factors are: competitiveness and decreasing government funds (page 4 and 5). These memes, as reasons to legitimize a change in structure, were replicated without too much alteration to other actors (Foundation and Board), and were still evoked at the end of the discussion by these actors. These factors and their description were no original ideas but, partly but literally, copied from another document (Van der Zwan, 1990) [33]. The last mentioned document was the result of a conference held in December 1990 by the Ministry of Education, on the same subject. In fact this conference was one of the reasons for the Foundation to ask the Board whether a change in the regulations was necessary.

This is an example of replication. A part of one document is copied to later documents and, in this case, to another institutional domain: arguments from a national discussion were copied into a discussion on policy making for a particular `private' university. The link between these two different discussions was fairly obvious since the national document was distributed among the members of the Council at the Council meeting in January 1991. Furthermore, important organizing concepts from the document, such as `integral management', were part of the official assignment to the committee. These organizing concepts also replicated successfully via the field of actors, as well as over time (they were mentioned throughout the whole process).

2.4 Selective interaction and arenas

Selective interaction, or `s-interaction'[5], is the second central concept next to replication. S-interaction processes result by definition in a direct or indirect weeding out of replicators. This always takes place in arenas. Therefore, arenas are defined as the place where s-interaction takes place at a certain moment in time. Arenas can be prescribed by the institutional system. However, different assemblies at different stages in the same kind of arena produce different s-interaction events. At these different events a different composition of the arena is probable: not all members will be present at all times. Especially if the collective actors in the arena consist of many members.

S-interaction can be illustrated by a particular difference of opinion between the Council and the Board of the University of Nijmegen. This s-interaction took place between the Council and the Board at several assemblies of the Council where the presence of the Board is required.

The Board and Council had agreed to implement what they referred to as `integral management', without damaging the `democratic quality of the administrative structure'. However, this agreement came down to nothing when it became clear what each of the actors meant by these concepts. Firstly, the Board interpreted `integral management' as the integration of `policy and control' (in Dutch: `bestuur and beheer'). In the past there had been a separation between the management of buildings, personnel and such like matters (control), and the management of the content of research and education (policy). This separation was particularly recognizable at the departmental or faculty [6] level, where a director was in charge of `control', and a board and council were in charge of `policy'. The Board, however, not only wanted to put Faculty Boards in charge of both of these management tasks but, secondly, also wanted to restrain the authority of the Faculty Council. They proposed to abolish the right of amendment and

initiative, the authority to decide on the budget, and so on. In addition they proposed to do the same at university level. The authorities of councils to decide on matters, would be brought back to the right to `agree', together with the possibility to appeal against decisions of boards they would disagree with.

The Council was furious. They had agreed with `integral management', meaning only to integrate the management of `control' and `policy' at faculty level, but they had certainly not agreed with any decrease of authorities of any council. The members of the Council felt that the board had distorted the agreement to a high degree. Besides the different opinions about the concept of `integral management', it also meant a difference of opinion on what `democratic' implies. The Board apparently argued that restricting the rights of the council to a right to agree did not damage the democratic qualities of the administrative structure, whereas the Council argued that the `right of amendment and initiative' were `fundamental' to any democratic administration.

In the end, the Board reached a compromise with the Council. The right to agree was taken up in the regulations, but not exactly as meant by the board. The right of amendment was ingeniously added so that the Council could add and change elements of proposals made by the Board before deciding whether to agree to a proposal as a whole. The Board in its turn could declare a particular addition `inadmissible' in which case the Council decides whether to agree to the proposal if not containing the addition. This construction was claimed to be an existent one, and thus a replicated meme, and referred to as the `vote blocque' construction. Furthermore, the Board still had to justify its actions to the Council, to which it opposed strongly. The Council lost its right of initiative, and was granted the right to advise.

In this example memes compete for a place in a policy plan. The memes that compete are the descriptions of authorities of boards and councils. However, these memes are not only replicated, but they are also in competition or, to put it differently, in s-interaction. The impossibility of both proposals (the right of amendment and initiative versus the right to agree) ending in the regulations, makes this event an s-interaction process where competition takes place: the right of initiative was weeded out. The right to agree and the right of amendment were not weeded out, since a new article was introduced to combine these rights. The right of amendment did change of course, because an amendment could be declared `inadmissible'. The mechanism by which the competition took place was negotiation, where both sides handed in some points of view to come to an agreement.

Although memes can be weeded out by selection because they are subject of discussion and negotiation, many memes are not. Analogical to neutral mutations and `spandrels' (Gould, 1997) [11] in biological genetic evolution, many memes in s-interaction processes are weeded out by coincidence. Most memes are never discussed, but simply make it into approved proposals because they are linked to memes that are discussed and selected for. They are not selected for, but there is (positive) selection of them.

When a meme (a structural entity) is not replicated but in the process of s-interaction, we will call it an interactor, corresponding with the definitions of interactor and replicator by Hull (1980; 1982; 1988a; b; see also Speel, 1996b) [14].

Memes can thus be both interactors and replicators. The name they are given depends on the process they are in at a particular moment in time. So the concepts of replication and s-interaction are definitions of process. Memes are the basic structural entities. When they are replicated or stored they are replicators. When they are in s-interaction, the same structural entity, or a translated form of it, is an interactor. A definition of process can easily be understood by taking a chair as an example. When you sit on it, it can be defined as a piece of furniture. When you hit someone with it, it is more appropriately defined as a weapon. A meme like "bald is beautiful" might be transmitted from a bald man to a man with a lavishly head of hair. In this transmission the meme is a replicator. But when the man with the beautiful hair thinks about it, he might really disagree. In the act of judging the meme as untrue, the meme is an

interactor.

While this standpoint may seem strange, we believe it to be well founded in the debate on species as individuals (see Ruse (1989) [24] for a series of papers relevant to this topic). Therefore, ignoring it will generate serious philosophic problems with the foundations of evolutionary theory.

These definitions of process are derived from biological evolutionary theory. There genes are replicators, which are translated into interactors such as enzymes, organisms and so forth (Brandon, 1988) [1] . The implications of this classification cannot be dealt with here, but are fundamental[7] to the difference between `Lamarckian' and `Darwinian' evolution.

S-interaction processes take place in arenas at a certain point in time. An arena can be the mind of an individual, but also the minds in collective or group decision processes, that is where people debate on the adoption of methods [8]. In the example of the University of Nijmegen the arena was the assembly of the Council. We speak of an `internal' arena when s-interaction takes place in one individual. When s-interaction involves more people we speak of an `external' arena. Accordingly we can speak of internal and external s-interaction. An internal retention system refers to (parts of) a brain and an external retention system is any retention system outside the brain, i.e. books, tapes and so on.

Summarizing the definitions of central concepts we end up with:

- An arena is a place where s-interaction takes place (at a certain time) according to certain rules (institutions).
- An interactor is an entity that `interacts in an arena where this action results in the weeding out of a replicator in a retention system'.
- A retention system is `a kind of memory where replicators are stored'.

In the struggle for survival of description of authorities in our case study mentioned above, the external retention system was a single policy plan, but the decision processes took place in multiple external arenas.

We may add that arenas are always coupled to retention systems: arenas serve as a kind of filter as to what memes get into their accompanying retention system. This is shown by the above-mentioned example. The decision to choose for either the right to agree or the right of amendment and initiative was eventually taken in an external arena. The retention system the surviving meme was added to was `the regulations'.

2.5 The selective environment and levels of retention

S-interaction in an arena results in the weeding out of memes. This weeding out can take place on the basis of different kinds of `criteria'. The sum of the factors being decisive on what memes are weeded out is called the `selective environment'. The selective environment is what causes weeding out (Brandon, 1988) [1].

The selective environment may consist of more or less formal criteria to weigh options. It might be decided that the authorities of councils should remain the same because `changing them will decrease the democratic quality of the structure', where the criterion is, of course, `keeping the democratic quality the same'. Dunn (1993) [10] describes a classification of different criteria people use in policy processes.

The selective environment may also be based on other kinds of factors, for instance the relative powers of decision makers. If a decision maker can decide what he wants, without taking into account the

opinions of others, his power will suffice for the decisions to be taken. The Foundation, for example, has the power to set and change the regulations of the University of Nijmegen without taking into account the opinions of Board and Council. The memes endorsed by the Foundation would thus win without contestation on content. Of course there are supplementary causes to this explanation. While the Foundation might do what it wanted without listening to Council and Board, we would still need to explain why it made decisions in the specific way it did. It may be possible that memetic s-interaction has taken place somewhere in the Foundation as well.

Memes that, through selection processes in arenas, make it into retention systems, may have a different status. A meme in a policy plan can, for instance, describe an action to be taken, or just be a description of something that needs to be changed. The policy plan (regulations) finally set in our example of the University of Nijmegen, included the decision to implement 'integral management', intending to be a compromise between that of the Council and that of the Board. But the decision to change the regulations also included arguments explaining why a change was needed. The decision implies memes referring to actions to be taken, whereas the other memes were just a part of the arguments to rationalize the change. The status of both kinds of memes is clearly different. We will refer to this difference in status as the levels of retention.

We distinguish four levels, to be referred to a `levels of retention', in the `status' a meme can have in a retention system:

1. to have knowledge of a meme;
2. to judge a meme to be relevant for a discussion;
3. to endorse a meme; and
4. to translate a meme into action.

An actor may have knowledge of a meme. One of the proposed policy actions can be to `abolish authorities of boards'. However, a member of a council who thinks that decisions get better if councils can amend them, may think this not to be a good idea. He may fear that decisions will be taken which turn out to be unworkable. Therefore he may judge it to be unwanted, and talk to his fellow council members, explaining this to be a bad idea.

Another council member may hear of the proposed action, but may judge it favourably. He then knows the meme, thinks it to be relevant for the discussion, and endorses it. He will probably also defend it when the truth or usefulness of the meme is doubted by others.

The fourth level is a more special level, since not all memes can be translated into action. Only prescriptive memes can be translated into action. When an individual endorses a meme that is a prescription he will act on it. Religions hold prescriptive memes of course, but so do policy plans. However, in policy plans it is usually the case that the individuals that have to execute the memes (policy implementation) are not the same as those who have the competence to approve on it.

The first three retention levels can be applied to memes in all retention systems. The fourth retention level is a special case.

A failure to differentiate in different levels of retention leads to confusion. Especially since more levels are already being used in the memetic literature. Dawkins (1976) [8], when referring to religions as meme complexes, uses endorsement and applications of religious rules and beliefs as success criteria. Best (1997) [2], for instance uses replicative success (level one and two) as success criteria. Vaneechoutte (1993) [29] uses replicative success in the phrase `successfully distributed - horizontally - into different brains', in the context of religions as meme complexes.

A failure to differentiate in different levels of retention can also obscure important insights. Many memes are very successful in spreading, exactly because they are not endorsed. There are, for instance, many discussions and papers about Lamarckian mechanisms in genetic evolution. In many discussions this meme is referred to in order to state the point that Lamarckian genetic evolution does not take place. The Weismannian barrier is often used to state the same point as well. Papers and books mention Lamarckian evolution with regard to the history of the field of biological evolutionary theory. However, in the context of cultural or memetic evolution Lamarckian evolution is mentioned to emphasise the difference between genetic and memetic evolution, and it is endorsed that cultural evolution is Lamarckian (see Gould, 1997) [11]. Taken together, Lamarckian evolution is a successful meme, but the factors for its success are mixed, involving endorsement and relevance to a discussion (because it is wrong) as the levels of retention.

In memetic theory a successful meme is often taken to be a meme that is `true' (Darwinian theories are more successful than Lamarckian theories in genetic evolution) or useful, to others with what spreads well. Needless to say that these two different criteria for success will yield very different results in memetic analysis, both for the dynamics, the mechanisms, and the selective forces involved. It is probable that memes that spread because they are not true, or offensive for instance, spread because they evoke a reaction from people opposed to the message in the memes. These people will replicate the meme while stating it is untrue or offensive. Calling someone a `Nazi" for instance on the internet will replicate that meme, but the emotional mechanisms involved will be different from when you argue that it is a shame that Princess Diana has deceased.

Diagram 1 shows a stylized outline of the framework where two collective actors interact in a policy-making process. Human H1 and H2 form one actor, and H3 and H4 the other one. In this process an old policy plan (D1 for document 1) is changed into a new one (D2). The memes in the documents are replicated to the internal retention systems. The lines stand for replication. Before external retention systems are produced (documents), s-interaction in arenas takes place, with its selective environments.

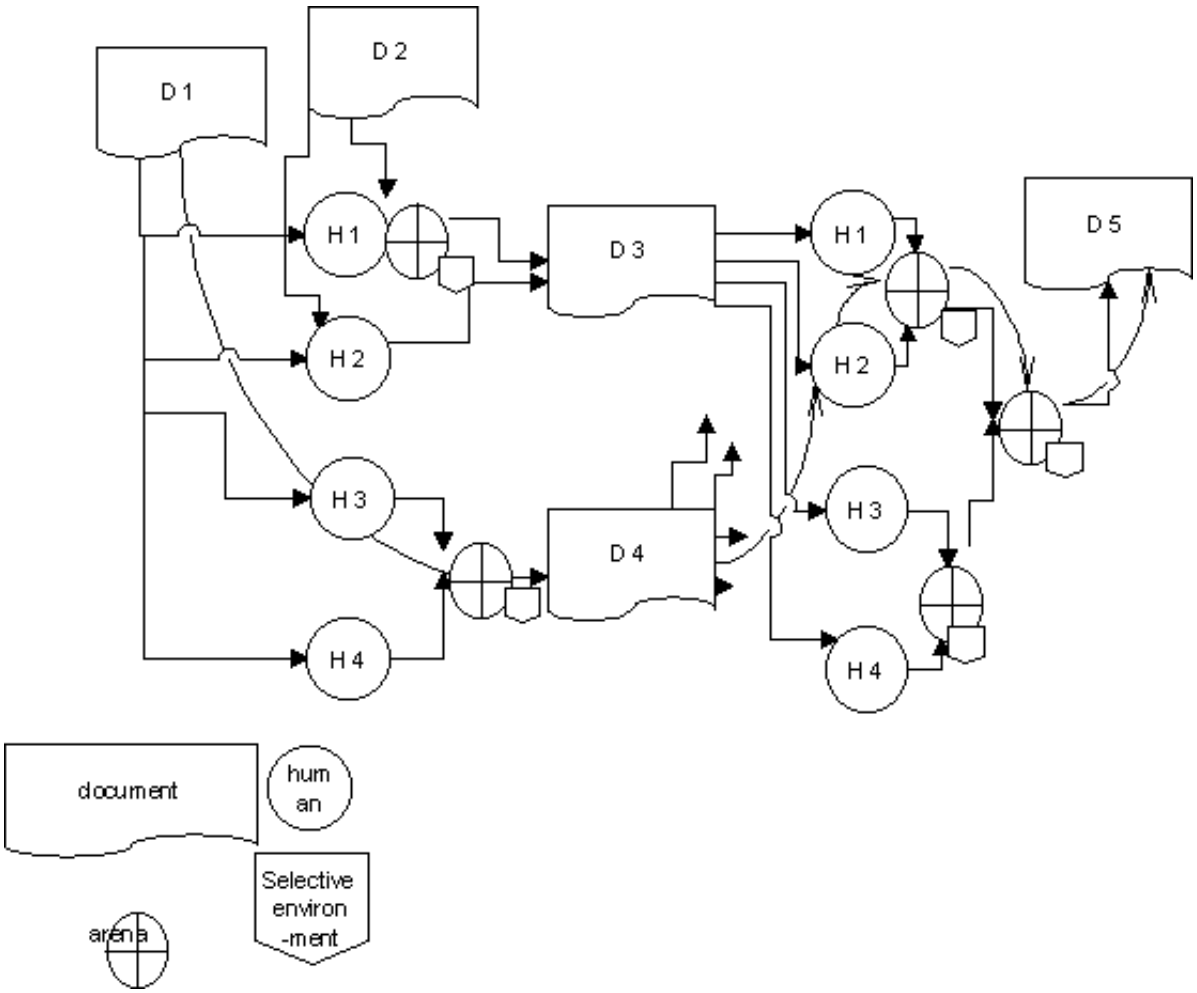

Diagram 1. A stylized representation of the framework. This diagram shows an imaginary case, with arenas, retention systems, actors and a lineage. Time runs from left to right.

The diagram is but a model of reality and, for the sake of clarity, not all details were depicted. For instance internal arenas can always be present with all humans in the diagram. Only the first arena on the left upper side is an internal arena and should be in the human. The second arena left below is an external arena. Also there are only single lines from humans to arenas. There could be a lot more lines, if the depicted external s-interaction is accompanied with internal s-interaction in the humans' internal arenas[5]. The third arena, in the upper middle, is followed by the last one without showing intermediate human replication. If the diagram should be exact, it would show humans after every external arena, since humans replicate memes.

D2 stands for documents and other memes that are used, and which come from outside the organization. In the middle, two propositional documents are produced by actors consisting of H1 and H2 (say the board), and H2 and H3, (say a council). Collective actors reconsider their endorsed memes after reading each other's documents and in the final arena the final policy plan D5 is agreed upon. The line going from D1 to H3, D4, H2, D5 is an example of a lineage that runs through the process.

2.6 Lineage

In this framework we recognize lineages of memes (the line in diagram 1 going from the first to the last document). A lineage is a logical result of the concept replicator. Genes and memes, or in general replicators, are repeatedly copied and thereby, over time, form a lineage. A lineage is thus a line of replicators connected by heritage, i.e. a (changing) historical entity. In the framework lineages `linger'

through retention systems by replication, possibly changing.

Replicators in lineages can change or mutate in many ways in memetic or conceptual evolution, yielding variation (see Price (1995) [23] for a possible mechanism). Hull (1988a) [16], for instance, refers to `weasel words' as words that change in meaning, whereas the actual word remains the same. To put it more precisely, the change in meaning takes place in a lineage, so we will refer to this as a weasel lineage. The discipline that studies such changes is called etymology. Take, for example, a word that is replicated inside a mind. Technically this is not a lineage, since memes are replicated from individual to individual. Therefore we shall call such a lineage an `internal lineage'.

Suppose an individual hears of the word `democracy'. He might take up this meme from others, with the explanation that it means `voting for a parliament, which then takes decisions'. Suppose the parliament in the example he heard were a national parliament. We can call the description with the example of a national parliament the `context' of the word, which gives the word its meaning. Suppose this individual then contacts a Dutch University and its administration in 1996. Here, there is then another kind of democracy, where an elected council takes decisions. The people involved tend to call this also democratic. The person then connects the word democracy he already knew from the national parliament to the new context of the council in the university. On top of that he might learn that the council, once elected, can ignore the opinions of the voters and that its behaviour, and therefore the council itself, is called `undemocratic'. This situation is illustrated in diagram 2.

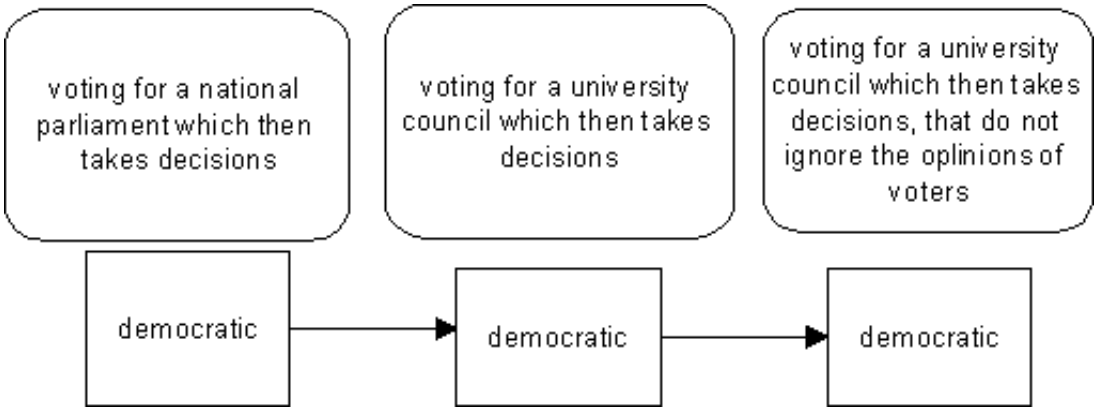

Diagram 2. A stylized representation of the weasel lineage `democracy' that changes in meaning.

What we see here is an internal (in one brain, or mind of an individual) memetic lineage that has changed over time by influences from outside. The meaning changed owing to connecting new contexts to the same word. In biology we would say that the lineage has mutated. In this example, democracy, is thus a `weasel lineage'. If the change in meaning means that little of the original meaning resides (according to some standard), we can either say that the lineage has split or that it has ended. In the first approach the word democracy is regarded as a lineage that remains the same, but the meaning attached to it changes; it is linked with different other lineages of concepts. In the second approach the word democracy and its meaning are regarded as one meme, and the change equals a mutation or new variation: a new meme is born.

This weaseling is even more likely to happen when memes are replicated from individual to individual. When the word `democracy' is replicated from a member of a national parliament to a member of a university council, it is bound to change in meaning. The individual who takes up the meme, will attach his own meaning to the word, depending on what he uses it for, and what he already knows about it. Memes that are thus replicated, will often change in meaning. However, together with a meme, its interpretation can be replicated simultaneously. So by communication on the meaning of a meme, individuals can `level' their interpretations.

While it is shown that a meme can have a very different meaning for different individuals, it still counts as the same meme as long as it is replicated directly. The change in meaning is irrelevant to the definition of what counts as a meme. The only decisive criterion for a meme in the same lineage is heritage.

In the case of the University of Nijmegen such `weaseling' can also be recognized. The Board in one of the proposals for a policy plan calls the `structure' of administration democratic when there is `a structured influence from representatives of the university community on the administration'. The Council interpreted a democratic structure as a structure in which the council has the `right to submit amendments and propositions together with the right to decide on the budget'. This example shows that the same concept meant quite different things for different actors.

Once you think about it, it turns out that almost all words we use which are conceptual (whereas words like `the' or `it' are quite stable), and which have meanings in the sense mentioned above `weasel about' quite a lot. In fact, when such weaseling is not wanted, it takes specific precautions to prevent its happening.

There are several stabilizing mechanisms in social processes to avoid weaseling of words or concepts. In science there are formal theories characterized by formal, and thus fixed definitions. In law there is jurisprudence which fixes the meanings of concepts by means of frequent interpretation of examples in cases. Jurisprudence acts as a `lock' on definitions. Once a concept has been given a specific meaning by a judge, or court, other courts and judges are required to use the same interpretation. If courts come into conflict a higher court must resolve this and re-establish a uniform interpretation. We will refer to the stabilization of meaning as `locking' a concept (or meme).

While weasel lineages are important for the creativity of language, they make a clear understanding in communication impossible where people need to concentrate on what they actually and precisely mean. In policy making this is of course very important, if we do not want to end up in endless misunderstanding.

Actors in policy situations that who to do something different from what they have agreed upon, can become very inventive with weaseling. In negotiation it is a common feature to make agreements which can be interpreted (connected to meaning) in many different ways, so that all partners in communication can agree. It is for instance an open question if the Board and Council would have agreed on `democratic' and `integral management' as starting points for a policy change if they could have foreseen that they would disagree later on the meaning of the words.

The examples of `democratic' as an internal lineage and as a subject of debate and confusion within the debates at the University of Nijmegen is also relevant to the evolution of the `democratic' institutions in Dutch universities in the past forty years. Before 1960 Dutch universities were governed by the Ministry of Education and by their own internal structures. The internal structure was dualistic in that the university was governed by a Board of Governors (in Dutch: `College van Curatoren'), but academic policy matters were decided upon by academics: Chairs (professors) at the basic level, the Faculty as intermediary and the Senate at the central level. The Faculty as well as the Senate were formed by all professors involved. In an act, seen as the first modern regulation of the Dutch universities in 1960, the University Education Act ('Wet op het Wetenschappelijk Onderwijs'; W.W.O), universities were given more autonomy (they were given an autonomous legal status), and the competencies of the Faculty were increased as opposed to the competences of Chairs. The Faculty became responsible for the coordination of exams and education. The universities were also financed differently in that they were no longer funded on the basis of expense account, but on the basis of centrally allocated budgets based on information given by the universities and connected to a formal planning system. The Chairs, however, were still appointed by the national government, thus limiting the autonomy of the universities. The

special universities, such as the University of Nijmegen mentioned above, were also included in the allocation of money, be it that they were only given 95 percent compared to state universities until 1970.

The basis of the `democratic' institutions was first laid down in 1970 in the act `Wet Universitaire Bestuurshervorming' (WUB; University Government Reform Act). It included the Council structure and also a list of explicit goals including `democracy' at universities. This law was passed as a result of student and academic protest against a national policy plan, formulated because the university structure could not handle the growth of the universities in the sixties. The policy plan proposed a Presidium of three individuals having not only the competences formerly held by the governors, but also the academic. The plan catalysed a strong protest movement in the opposite direction of the concentration of competences toward democratic structures.

The WUB was passed as an act in 1970 and would eventually last fourteen years, until 1984 (These data are based on Groot; 1988) [13]. The democratic structures, however, lasted until recently: in 1996 the `Modernisation University Governmental Organisation Act' was passed ('Modernisering Universitaire Bestuursorganisatie' (MUB)) which reduces and changes the influence of councils.

A memetic empirical question here is where the `democratic' memes in the WUB came from. Some say they were derived from the Dutch laws on the government of municipalities, but others deny this. This question might be answered by a study on who actually wrote the proposals for the WUB and what sources he or she used. Another more objective method would be to analyze the WUB, and proposals that preceded it, on specific word phrases to see if they fit words phrases in the law on municipalities.

However, it is obvious that since the WUB was introduced in 1970 the democratic memes (as well as their formal interpretations resulting in regulations of individual Dutch universities) have been around in the formal body of law in the Netherlands, and that they can be regarded as one lineage or perhaps a network of lineages.

It may be nice to observe that the University of Nijmegen was experimenting with democratic structures before the WUB was passed as an act, and that the changes in the regulations described above were also prior to the MUB. Since special universities in the Netherlands were allowed to have different regulations (and state universities were not, although this has changed somewhat since the MUB), they can change their regulations based on their own interpretations and goals. In other words locking mechanism of legal memes that have been present for state university regulations (they were to be approved of by the minister) were not operating as vigorously on the regulations of special universities. The results of both policy processes, the national one and the one at the University of Nijmegen, are also quite different. The board of the University of Nijmegen however, is already planning to change the regulations again toward the present situation in state universities.

So far we have been talking about conceptual lineages. However, to be complete we must mention that Hull (1988a) [16] discerns two kinds of lineages: social and conceptual ones. Conceptual-, or meme lineages are lineages of ideas, theories and the like as we have explained above.

A social lineage is a group of people that can lose and gain members, that has the same name or is bound together by a common interest, task, etcetera. Social lineages are for instance actors in policy and in political theories. They are called lineages because they are bound together by a historical line that can be traced. While the membership of such a group does change, and possibly also the name and/or the ideology, we still see such groups as one and the same. Thus their identity is essentially based on historical lines.

Before completing this part of the paper, in order to avoid confusion, we need to mention that `lineage' in

biology can have two meanings. First of all `lineage' may mean a replicated line of genes. In this case a gene stands for a complex of pieces of DNA that codes for one protein which, in such a lineage, may change by mutation, including recombination.

The other meaning is that of a species (or a sexually reproducing `lineage') which can also be called a lineage or a `whole' that changes genetically over time. It is this type of lineage that is commonly said to evolve by natural selection. While a lineage of genes may mutate, a species as `lineage' can adapt. In this paper we will refer only to the first meaning of the word lineage. The second meaning for systems that can adapt or learn should be referred to as a `selective retention system' (Campbell, 1974) [5] or perhaps an evolver[9].

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3. Implications of the Framework

The framework has implications for a) public policy theory and b) memetic theory.

3.1 Implications for public policy theory.

There are five main implications for public policy theory.

Firstly, the framework describes the cognitive side of policy making according to the modern evolutionary paradigm. Therefore it can be used to `translate' understandings from different disciplines of science that were separated before. The understanding acquired in different disciplines is more readily usable and this can yield new theoretical combinations. More specifically, the elaborated `toolkit' of modern evolutionary concepts in biology can now be used in disciplines where it was not used before. This toolkit has many benefits, among which the dynamic characteristics, in contrast to, for instance, the approach currently used in institutional economics (Williamson, 1985) [32]. Furthermore it can describe well variation production or, to put it differently, innovations (which has enriched economic theory as well), and brings along population thought as an elaboration to platonic essentialism[10].

Secondly, the framework focuses on cognitive processes in policy making. Many policy theories describe policy making as being mainly a political process, where actors interact to increase or keep their power or income, and to defend their ideology or points of view. Such theories refer to the political or power-driven rationality (often only to be established after actions have been taken) by which actions of actors can be described.

This framework can be used to emphasise that the cognitive processes by which choices are made are not only driven by political factors, but also by the development of the understanding of the content of problems and solutions. Where many policy theories do acknowledge that this understanding is a factor, they do not have a model to describe how it develops. However, if we want policy processes to result in the solutions of problems, this understanding is crucial.

In other words, the framework focuses on interpretative institutions, where most policy theories focus on interactive institutions (Campbell, 1995) [4]. Interactive institutions are about the interactive behaviour of actors with regard to the political power. Interpretative institutions are about the models with which problems, solutions and so on are described. So our framework can serve as an elaboration on theories on political interaction between actors.

Thirdly, rational, non-rational and other factors in selective environments can be viewed together in one framework. In the real social world both emotional factors and rational deliberations on what to do play a

role. Emotional factors include group identity, non-rational preferences of individuals for specific actions over others. Furthermore, factors as the `catchiness' of concepts, persuasion caused by an intimidating personality of an individual, for instance, and so on may play a role. From the specific memetic side of theory we can add that meme complexes may have become adapted to be endorsed and dispersed successfully, resulting in memes that are hard to resist.

Some actions can simply be popular at a time, while nobody can exactly tell why they should be taken. Some actions might be adopted because respected people say they should be taken, or because they are brought forward in a persuasive manner. Lynch (1996) [19] gives the example of memes that are selectively replicated among different social classes in society. Fashionable memes in a `higher' class are often resistant to memes in lower classes. It may be that actors (or individuals) who see themselves as members of a higher class will resist memes that are proposed by actors in a lower class. This can be generalized by saying that members of a group with some identity might resist memes coming from other groups. Famous examples of course can be found in struggles between employers and employees, or between memes of environmental activists and entrepreneurs. Some actions that entrepreneurs can take to improve the environment are good for profit as well. Still such actions can be resisted, simply because they are proposed by environmental activists. Of course the same kind of processes play a part in policy making elsewhere, including public policy.

The concept of the selective environment enables us to group these factors into one concept. This may seem trivial, but many disciplines only consider either rational or non-rational factors without integrating them. In policy sciences rational deliberation is often seen as the basic explanation for decisions.

Fourthly, through the concept of lineage, the framework implies a (specific) historical view on deliberation. The models used to describe problems and solutions are historical entities, either made up when needed (new variation) or copied from already existing memetic sources. This puts the view that organizations are under the rational control of humans even more in perspective than the concept of `bounded rationality' implies.

In a policy process descriptions of problems and solutions or, in other words, goals and actions can be copied from other institutional systems or from previous discussions in the same institutional system. For instance, the description of the problems of the University of Nijmegen were copied from the national discussion on changes needed for public universities: a different institutional system. Another possibility is that descriptions are already available from past discussions in the same institutional system. When descriptions of problems and solutions, or conclusions from discussions (s-interaction) from the past are copied without deliberation whether they are correct, we might speak of `conditioned', or rule based decision making. Memes from the past are copied when current events seem similar to previous events, or events experienced in other institutional systems. Thus the similarity of events leads to the appliance of previously developed memes.

As an example of theories that do not account for the cognitive development of concepts and models, we might refer to `bounded rationality'. The concept 'bounded rationality', or satisfising behaviour has become accepted when referring to decision-making. This concept implies that the selective environment for a decision (the problem to be solved) is already clear, but that there is a limit to the time and effort people will spent in finding the solution. Our memetic lineage concept elaborates on this in two ways:

- The definition of the problem itself can be seen as part of, or the result of an s-interaction process. But more important is that the process by which solutions are searched for is also built on definitions, conclusions and concepts acquired in the past. These historically formed 'conceptual building blocks' are replicated in present time s-interaction processes. The descriptions of problems and solutions actually used, can be far from optimal. They may be ill-founded when conclusions

reached in the past are incorrect. This may also include the complete frame in which problems and solutions are seen.
- The search for the models in which problems and solutions can be described, as well as the application of such models in a new situation, takes time and effort. The restriction of the time and effort people are willing to invest [11] in finding the right models, must be distinguished from the restricted effort to find solutions when the problems are already clear. Only this last restriction is what is referred to in `bounded rationality' (Simon, 1976) [26].

Thus rationality is not only bounded by the effort to find solutions, it is also bounded by the abundance of seemingly fitting models, concepts and conclusions already available.When models are available that `fit' the problems to a certain extent, it still takes effort to `tinker' (in the sense of Jacob, 1977) [18] these, so that they fit a new situation. The `tools' of deliberation are tinkered from old memes to possibly new and better fitting variations of these memes.

While we can use the concept of bounded rationality to account for the cost of finding solutions, bounded rationality will expand in meaning if we include the cost for the tinkering of models to view solutions and problems with, and the solutions and problems themselves. Furthermore, bounded rationality of course does not describe mutating memetic lineages.

Fifthly, the framework can describe lineages penetrating different policy organizations, policy themes and retention systems. This description makes explicit what everybody knows: people, and also policy actors, only create very few new descriptions, and solutions. They are often copied from what is already known elsewhere. The memetic view contributes to the study of how this happens and, for instance, why some solutions are so popular at certain times.

Once fashionable opinions and plans are recognized, it can be asked whether these fashions make any sense. Why do all universities in the Netherlands follow each other when changing their rules? To us, this epidemic characteristic of meme dissemination is particularly fascinating. The grouping of explanatory factors in the selective environment enables us to come up with hypotheses on what factors were important in specific processes. The possibilities we have sketched as factors are irrationality, rationality (political and with regard to the description of problems and solutions) and conditional decision making.

3.2 Implications for memetic theory

There are three main implications for memetic theory.

Firstly, if we view organizational processes in the memetic historical way as explained above, it becomes clear that even when organizations are managed and controlled by humans that behave with bounded rationality, their actions and deliberations are guided by already existing lineages of memes. The few choices bounded rational actors make, are thus partly under the control of memes already available. As Price (1995) [23] states: 'the organization can be seen as the product of the meme'.

This realization leads to the hypothesis that a considerable part of human memetic processes is replicative, as opposed to processes where deduction and deliberation yield new memetic variation. One can ask how much of human memetic evolution is replicative, and how much new memetic variation is involved? To investigate such a thesis we must, of course, first define what counts as new variation in practice.

In a policy context we can ask what processes and elements of institutional structures lead to more memetic variation? Price (1995) [23] for instance holds that a kind of isolation mechanism of meme complexes can yield new memetic variation. It would be a challenge to define and investigate such

hypotheses.

Secondly, the issue whether memetic evolution is different from genetic evolution has generated some debate (see Gould, 1997 for instance) [11]. We agree with Hull (1982) [15] that many proposed differences are simply misunderstandings, among which the claims that memetic evolution is faster, Lamarckian or that only memetic evolution shows horizontal transmission of replicators. Instead we propose a new difference: Interpretation mechanisms in genetic evolution are almost always similar, contrasted by memetic interpretation mechanisms that almost always differ. This results in a different mechanism for variation production in memetic evolution: weaseling.

Finally, in examples used in memetic criteria, different levels of retention are used. We have argued that these levels should be distinguished properly to avoid confusion.

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4. Conclusions

Memetic theory has been applied in the philosophy of science (Hull,1988a) [16], in models of consciousness (Dennett, 1991) [9], or for describing religions (Dawkins, 1976) [8]. If these applications have been useful, we have shown that memetic theory can also be usefully applied for policy science. Our framework describes policy-making processes as memetic selective processes, using definitions derived from modern evolutionary theory.

We have presented some observations that are elaborations on current memetic theory. We have shown that memetic lineages of conceptual words may appear to replicate without too much alteration, but that their interpretation can vary at the same time. The mechanisms and forces that produce this variation or weaseling are probably important forces in memetic evolution in public policy since special social `locking' structures exist when such weaseling is unwanted. We have also shown that memetic evolution theory contains different levels of retention. Without these levels in success-criteria memetic analysis will be less explanatory.

Apart from these observations the framework contributes to theoretical innovation by connecting different fields of theory: policy theory and evolutionary biology.

Furthermore, we have argued that the framework contributes to policy theory in two ways. The use of the concept `selective environment' makes the framework suitable to view rational, irrational and other factors as competitive or complementary explanations (selection forces) for decisions taken. A solution may simply have a good ring to it or be popular in a certain social group. It may be taken in a rush, or pass unnoticed because it is linked up with more controversial issues (in which case it is neutral). Most other theories presuppose only one of these forces to be relevant.

Realizing that many forces can play a part in decisions is, of course, an implicit criticism of the view that decisions are taken by rational deliberation only. It results in the view that human planning and anticipation can have very little influence on human organizing processes. Thus memetic evolution is less different from genetic evolution as may intuitively be assumed, since one of the differences between biological and memetic evolution is often taken to be anticipation and intentionality.

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Glossary

Actors:
organs or agencies, individuals or groups which play a part in the policy-making process. Different parts are writing reports and interacting (including taking decisions).

Arena:
the place where interaction takes place at a certain time, possibly according to specific rules set by institutions.

Bounded rationality:
actors are rational but their time, resources and knowledge to make and base decisions on is limited; so they stop deliberating on how to act at some point in time. Thus they are not perfectly rational. Actors that show bounded rationality are satisfising instead of optimizing. They stop searching for solutions when a solution they find or come up with meets their standards. They do not infinitely search for solutions comparing them in order to see what solutions are to be preferred (optimizing).

Conditional decision making:
(also known as rule-based decision making (March, 1994) [20] the process of taking a certain decision, simply because it has been chosen in comparable situations in the past. The `stimuli' of a certain problem leads to a reflex or routine of picking a certain predefined solution.

Institutions:
rules according to which specific actors or individuals behave; in other words, stable patterns of behaviour.

Institutional system:
the rules of behaviour according to which actors act in arenas and by which some retention systems are defined. Formal and informal institutions include the definitions of some arenas and the part actors play there.

Interactor:
an entity that interacts in an arena, where this action results in differential perpetuation of memes into a retention system.

Internal lineage:
a lineage of memes which are replicated inside one mind.

Levels of retention:
the different status which memes in retention systems can have. Some imply actions that will be taken, others can be descriptions, arguments, and other memes.

Locking a concept (or meme):
the stabilization of meaning of a concept, or levelling the interpretation of it.

Lineage:
a line of replicators connected by heritage.

Memes:
pieces of data that are a) copied from individual to individual without too much alteration, or B) that are interactors.

Policy making process:
- a process in which individuals, groups and/or actors interact on the basis of different views and convictions, with a policy plan as a result. Problems and solutions amongst other elements, often tied to specific actors, compete for recognition in policy plans. A policy plan can be a written

document, containing plans to change (an) organization, or it can be an execution of changes made in a short period of time which are perceived to be related to one policy question or theme.
- a process in which an administration, or other actors and/or individuals think about, formulate, communicate and decide on plans to change things in society or in the organization itself.

Rational:
the use of deliberation or reasoning in making choices. As opposed to irrational choice (where affectionate and emotional factors are causes of decisions) and conditioned or rule based choice.

Replication:
the process where replicators are copied from one retention system to another.

Replicator:
a piece of data that is copied from retention system to retention system without too much alteration

Retention system:
a kind of memory where replicators are stored.

S-interaction:
the process that results in the weeding out of replicators, be it directly or not.

Internal s-interaction:
s-interaction where the arena is the mind of one individual.

External s-interaction:
s-interaction where the arena consists of more than one mind.

Selective Environment:
the sum of the factors, or in other words causes, decisive on what memes are weeded out in a selective event or in a number of selective events.

Selective retention system:
a system in which replicators, having coded for winning interactors that interacted on the basis of a common selective environment, are retained.

Weasel lineages:
lineages which consist of replicated words that change in meaning, whereas the actual word remains the same.

Weismannian barrier:
the barrier between behaviour acquired in the lifetime of a biological organism and its genes. This barrier is referred to in order to show that the genes of an organism cannot take up such learned behavior. Genes and gene complexes only change by random variation and recombination. Natural selection takes care of deleting less `fitting' variation, possibly resulting in adaptations.

Notes

Title

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Note 1

Rationality, irrationality and bounded rationality are concepts that are accepted in public policy theories, but which have to be defined because they are used in many different ways. Rational here is used to refer to the use of deliberation or reasoning in making choices. Following Simon (1964) (25), choice is

irrational when it is dominated by affective mechanisms such as emotions and instincts. Bounded rationality is used in the original meaning Simon (1974) (26) gave it: actors are rational but their time, resources and knowledge to make and base decisions on is limited, so they stop deliberating on what to do at some point in time. So this does not lead to perfectly rational based actions.

Note 2

Dutch universities consist of a central level and faculties. The faculties are the organizational parts where research and education actually take place. American universities often refer to this as `divisions'. The word thus refers to a part of the organization, and not to what Americans understand by faculty: all personnel that teach or do research. These Dutch faculties (until 1997) always have a board and a council.

Note 3

The regulations of the University of Nijmegen are made up of three hierarchical levels of regulations: the articles of association, the structure regulations, and other regulations. These levels differ in the procedure by which they can be changed. The higher the regulation, the higher the actor needed to change it. In the case study the structural regulations were changed. In these regulations the administrative structure below the level of the Foundation is defined.

Note 4

To put it clearly, we would have to say that replicators are memes if their lineage has in the past been copied by brains. Here we assume that behavioural bodily patterns, also being memes, are also replicated by the brain.

Note 5

Hull (1980) (14) defines interaction as the process that results in the weeding out of replicators. However, in order to avoid confusion, we will refer to the same concept as selective interaction or s-interaction. Interaction in policy theory often means something like 'actors or individuals that take actions with regard to actions of others'. A policy scientist will call two individuals talking to each other interaction, while this is not what Hull is referring to when using interaction as a concept.

Note 6

See previous footnotes.

Note 7

The distinction between replicators and interactors is connected with the division of what Pattee (1977) (22) refers to as code and matter. Williams (1992) (31) speaks of the `codical domain' when referring to code. Code can be replicated but, what's more important, can also be interpreted. The interpretation takes place by means of an interpretation system, and results in matter. The difference between matter and code is that code is in a `rate-independent dynamical mode', whereas matter is in a `rate-dependent dynamical mode'. In the example of DNA as code, rate-independence refers to the timelessness of the code. In transducing the code into matter, a time component is added, when the sequence of code is translated. Rate-dependent matter then has a form which interacts with other material in the cell where

time is an important factor in the chemical processes of interaction. To code time is not important: the data are stored without time being an important factor to the code. The use of `matter' here is , of course, no claim that code does not exist as matter as well. It simply states that the data in the code is not directly relevant to interaction processes. The data in the code becomes directly relevant to processes only after interpretation.

When a structural entity crosses this matter-code barrier, it is `transduced' (Pattee, 1977) (22). In biology the interpretation system is the cell mechanism, which translates (while also transducing) specific parts of DNA at a certain time into enzymes. This theoretical theme is of course related to the genotype-phenotype distinction, since genotype is code (Calling phenotype only matter however would appear to leave behavioural parts of the phenotype out. However, it is clear that phenotype is no code.) Code has no meaning when separated from a translation system. Pattee (1977) (22) describes for instance that the biochemical mechanisms of the cell give DNA its meaning. The ability to discern between code and matter is for instance of importance to understand the Weismannian barrier. Without this barrier, the difference between `Lamarckian' and `Darwinian' evolution cannot be maintained.

In memetics we can also discern translations and transductions. They always take place in the brain. However, we do not have an accepted theory of how this takes place in the brain. For instance: are `thoughts' code or matter? Are memories in the long-term and short-term memory code or matter? I have no answer to this. Does the claim that a memetic Weismannian barrier in the brain does not play a part in memetic evolution mean that there is no barrier, or that it is crossed?

The inability to describe what things in the brain are replicators or interactors poses difficulties. For instance, I do not know how `thoughts' are connected to the material of the brain. This also means we don't know if interactors and replicators in the brain are separated as code and matter as they generally seem to be in genetic evolution. Replicators in biology are almost always code and interactors matter. But can interactors also be code, and are they in the brain?

Calvin (1997) (3) refers to experiments on "RNA evolution" that do not involve a genotype-phenotype distinction. This implies that interactors can have codical characteristics while they function as matter.

We feel that in the end the part an entity plays in a process should be predominant in solving the question if an entity is a replicator or an interactor. This implies that some entities that are replicators can also be interactors (the RNA for instance). Interactors thus may have `codical' characteristics.

This may result in the conclusion that a memetic interactor in the brain has features of code. Whether this is correct remains unknown until we have a proven transduction theory for memes in the brain.

Whatever the problems with memes as code or matter, it is clear that memes in policy plans can be translated in two kinds of interpretation-steps by humans. First a meaning is attached to a meme (as in the weaseling described in this paper), and second this meaning can be one of the factors that causes specific behaviour of humans. In organizational and policy theories the relevant concept describing the translation of described actions into actual actions is implementation of policy. Some policies, such as laws, have well -organized interpretation systems, such as courts. Other policies are never transduced into actions at all.

Note 8

When a group of humans is debating, s-interaction takes simultaneously place in multiple arenas: in the mind of one or more individuals (internal arenas), and possibly also in an external arena. In such a case, the question arises whether the humans or memes, or both, are the interactors. In all cases memes are of

course the replicators.

The question what entities should be called interactors in an internal arena is easily to be answered. Inside an internal arena memes are always the interactors. In an external arena the answer is more difficult. Do not individuals s-interact just as memes?

The answer is that individuals are most of the time the interactors. Only when multiple individuals (or groups that speak with one voice) make a choice on the basis of a common view and thus criterion, is it that memes are the interactors in the external arena.

When a choice is made on the basis of one or more shared criteria, all individuals communicating in the debate should come to the same conclusion. We can safely state this to be an exceptional event. This is only the fact when the criterion and the interacting memes are interpreted in one way by all individuals. This can probably only happen in environments where strong `locks' on weaseling are executed. It is far more likely that individuals 'think' they agree on interpretations, but that in fact they all make different deliberations, and yet do agree with the outcome.

When actors do not agree on interpretations, other factors will influence the outcome. For instance the power of one group over others.

If memetic criteria are decisive in a decision process, s-interaction does not only take place in the external arena, but also in the minds of the individuals involved. Memes in internal arenas are interacting simultaneously with memes in external arenas. While it appears that a group is deciding, individuals decide themselves too, and `level' (communicate and agree with) their decision with each other. Of course it is possible that not all members do agree, and that in the mind of disagreeing members a different s-interaction will have taken place.

Note 9

Consistently with the definitions of our framework a selective retention system is `a system in which replicators that have coded for winning interactors that interacted on the basis of a common selective environment, are retained'.

Our framework could be used to focus on selective retention systems (Campbell, 1974) (4). We have however chosen not to do so in this paper, although we plan to do so in the future. The approach of the framework as presented is thus a selective one.

In evolutionary theory we can discern selective theories (Cziko, 1996) (7) and theories describing evolution by selection or, in other words, `learning by trial and error'. Systems that behave in such a way are called `selective retention systems'.

Theories of competition between firms resulting for instance in a monopoly, are selective theories, just as the description of different species competing for niches in ecological theory, without including the generation of adaptations of these species.

Evolution by selection-theories would of course include Darwin's evolution by natural selection, but also `evolutionary learning' in economic theory as Vromen (1994) (30) mentions, or the `trial and error learning' that Campbell (1974) (5) speaks of.

Note 10

Ernst Mayr (1982) (21) has pointed out that population thought is an important essence of Darwinian theory. It is opposed to Platonic essentialism. In short this can be illustrated by saying that essentialism describes entities according to their `essence' for instance when we classify entities. For example describing a species in terms of characteristics can be called platonic. Darwinian theory uses population thought which describes the difference in entities. A species would thus be described as having variation in a particular distribution. This is of course important because selection cannot be described without differences it can operate upon. The explanation of innovations thus needs population thought.

Note 11

Although we speak of `are willing to', the choice of such models is often not consciously voluntary. People are often unaware of the models they use, and so have not chosen at all. They simply use the memes they are acquainted with.

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