

Classification, Symbolic Representation and Ritual: Information vs. meaning in cultural processes

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Abstract¹

Anthropologists synthesize collective representations at a symbolic level. However, anthropologists have found difficulty relating the symbolic to the descriptive. Symbolic approaches have been successful at uncovering good ideas but are unable to establish their value. This paper explores the possibility of using information theory as a means of extending the range and power of more traditional methods by looking at the properties of the entropy of different cultural knowledges when applied in a range of contexts. In particular the paper is concerned with finding a means to describe cultural models that corresponds to evidence and resources available to cultural agents, and thus not based on detailed quantitative knowledge about parameters, nor laboured with a 'pure' logical universe of truth and falsehood. The correspondence of entropy to the 'power' of a knowledge to work either in a limited context or across a wide range of contexts is one such candidate. This has the added benefit that it describes knowledge and applications of knowledge in a framework which is subject to adaptation and change.

Anthropologists synthesize collective representations at a symbolic level. Using a range of literary and expository techniques and conventions, they communicate a sense of the content of these representations, how they vary, and how these change over time [Davis, 1984]. They also produce detailed descriptions of human behaviour, though of necessity these are also often synthetic, drawn from a lot of partial experiences or individuals' accounts of experience.

Where anthropologists have found difficulty is in the critical area of relating the symbolic to the descriptive. As D'Andrade [1995] relates in his account of the development of cognitive anthropology, it is only since the 1950s that explicit systemic relations/distinctions between concepts and behaviours has been available to anthropolo-

gists, though one can find less explicit use of this idea in earlier work, especially that of Whorf. However, the norm is to either consider the idea and the action as one (e.g. if X says she does Y, QED she does Y), to produce analyses of the world as if it were contained in language, or to produce detailed descriptions of behaviours with some hand-waving interconnection with 'beliefs'. Such descriptions make no distinction between what is 'known' or 'believed' to need be enacted, and the actions themselves. The excuses for this have not been very convincing.

Anthropologists have been long concerned over the analysis of the less material creations of people. In particular those entities that appear to be creations of the mind. However there are severe problems with the approaches that have been used. Symbolic approaches have been rather successful at uncovering good ideas for relationships within society, possibly the only manner for producing these. However, they fall short in being able to establish that these ideas are anything beyond good ideas. That is, there is no immediate method for testing these revelations. The classical methods for doing this, triangulation and participant observation go some of the way, but fail to provide methods of confirmation that themselves can be easily compared or generalised. Results from recent research projects [Fischer & Read 2000; Fischer & Zeitlyn 2002] together with some pilot research suggests that suitable application of information theory may provide an initial means of extending the range and power of more traditional methods, at least for a limited domain of ethnographic problems.

1 Investigating the interface between ideational and material systems

Although meaning and ideas are rather more than information, these are impossible without information and the channels through which information flows. Information theory suggests a number of conditions that must exist for meaning and knowledge to exist.

What we hope to accomplish using information theory is to investigate the structure of symbols used to represent different contexts and the contribution of the presence of a given symbol in terms of information. Of the different possible interpretations, what is the information potential of the sign/symbol with respect to each interpretation? And what is the information potential of the interpreta-

1. The research this paper is based upon projects sponsored by the ESRC (UK) and AHRB (UK). Their support is gratefully acknowledged.

tions with respect to the symbol? It may be the case that symbols imply many more contexts than each context implies symbols. That is, symbols are associated with contexts, rather than contexts associated with symbols. This would be the case if, as we often assume in discourse, symbols are more general instantiations than contexts. This, of course, makes a bit of nonsense of the notion that the meaning of symbols is context dependent since the context evokes the symbol in the first place. What we should be saying in this case is that symbols are classificatory targets associated with contexts. Their meaning is the context plus the information potential of the context as instantiated by the symbols that can be associated with the context. The symbols are not in the context at all, they are products of the context.

We can measure this potential in a number of ways. Across subjects we could use some form of correlation, with r^2 being the information potential. But this is difficult to control, and very difficult to accomplish under field-work conditions. Another approach is to produce deontic parameters rather than probabilities [Fischer and Finkelstein, 1991]. Probabilistic parameters operate on the assumption of direct or indirect causality; either one factor causes another, or the factor is proportional to another (perhaps unknown) parameter that causes the variation in the second. Deontic parameters indicate enablement as the principle representation of variability. Non-variation is handled by obliged and \sim -permitted operators. The permitted operation is also itself non-variable. But within a flow of independent stochastic events, permitting and \sim -permitting formulae can modulate the flow of logic in response to these events using much simpler models that would be required if we were to insist on a local causal model incorporating both variable values and variable degrees of applicability which can get very messy very quickly.

The deontic formulation requires finding/constructing absolute enabling conditions, which can have a complex aetiology. However, this is much easier than collecting reliable data to support overtly causal analysis. And, despite the 'absolute' status of the deontic rules, they are consistent with non-monotonic outcomes, especially when the events triggering the rules are themselves stochastic. Indeed the use of a distributed deontic framework for situating data collection and analysis may prove to be a useful starting point for progressing to more detailed quantitative approaches.

2 Entropy and information in culture

What are the costs of maintaining one cultural knowledge vs. many? Indeed what is the cost in information of too many? Is there a practical way to implement measurement in a meaningful fashion based on information and entropy?

Entropy is a measure of order in a system of structures. A system of structures can be seen as the predictability of a system. Human systems must fall within certain boundaries to work, not too little entropy, else the system be too rigid, and not too much or predictability falls below limits necessary for survival or communication. The system of structures falls into two categories. First, the system as

perceived by the agent. Second the system as it 'really' is. The difference in potential entropy between the two systems is very interesting.

People work through models (or representations) of systems, not the systems themselves. Information theory, while it cannot address issues of content or interpretation of the symbols information etc., can address the foundations upon which these must depend, providing a basis for more rigorous argument, and providing a means to support one view over another, since some arguments will depend on informational structures that can be proven not to exist or of excessive complexity relative to the other, given specific data. It also provides a way to evaluate phenomenological arguments - although we cannot prove that we know how people perceive their world, we can know something about the structure of what there is to know, and how limited the constructions are to deviate on specific issues.

Thus in the case of the Nggwun ritual of the Mambila of Somié [Zeitlyn and Fischer 2002], we cannot know what or how the Mambila perceive Nggwun, but we are certain they do perceive it as it is their ritual after all. We can make judgements about the entropy of their model of Nggwun. Indeed their model of Nggwun generates a reality (the performance of an instance of the ritual) that we must produce a model of to describe and understand. Zeitlyn, through broad longitudinal investigation 'knows' more about the potentiality of Nggwun than any of the other residents of Somié (although there are many things that Zeitlyn does not know about Nggwun). This is not an uncommon situation for ethnographers to be in, and it provides a possible base from which different properties of the entropy of cultural knowledge with respect to different consultants.

The major aspects of IT that we can exploit here are levels of entropy, and more specifically the intervals these represent. There is the ambient entropy, E_0 , that which we would expect to find if all the considered information in the system was independent of all other information under consideration and are equiprobable. E_1 is a measure of entropy that takes into account the relative frequencies of the information designators. E_2 is a measure of entropy that takes the conditional probability of the information in pairs. E_3 the entropy based of conditional probability in triples, etc.

This is fine for situations where we have complete inventories of possible symbols and accurate counts. But many of the problems we might like to apply this method to are not so well defined. We can, of course, work with the inventory we identify. Indeed we may be able to devise a test to establish the etic/emic status of a symbol by the way its entropy is patterned. Deontic reckoning would be based on the total number of contexts where we believe that a symbol could be present relative to the number that it appears in relative to another symbol, the number it appears in relative to the absence of this same symbol, and the number of contexts where it does not appear.

Thus E_0 is simply the number of symbols divided against the number of contexts. E_1 is the number based on the actual presence or absence of the symbol and context.

E_2 is the co-occurrence with and without a given symbol and the number in which it does not appear with and without this symbol. E_3 is this relative to pairs of symbols, etc.

3 Pragmatic Information Theory and Cultural information - OR - Nonmonotonic Information Theory and Powerful Knowledge

If culture is truly 'shared' the information content of many cultural acts is very low or zero - no information is required to 'anticipate' the act. This does not mean it is not useful but simply that no information is transmitted because the message, as such, is already known.

If there is information transmitted it is only because it is possible that the message is not the only message. There must be contingency for there to be information. There are two possible states when there is contingency. One is if the 'expected' response occurs that no information is transmitted because the message was anticipated and expected, e.g. the expected entropy (by the cultural agent) is zero (although the actual entropy for the situation may well not be!). However, there is perceived entropy if the response is marked, because it was not anticipated. This ties into the marking theory of Jakobson [see Hage 2001]. What would our formulation of information theory be if some of the messages have zero information and some messages have information? Indeed, can we predict the typical amount of contingency in a system, or can we treat all information laden responses as effectively the same (though with differential probability), but the zero meaning message being the most probable in a situation?

On the other hand where the expected message is itself based on prior information (like social status), where is the information...in the indices of social status, or indeed does the message itself have meaning because it denotes social status. E.g. the message has zero information relating to the primary domain of the message (such as discussing women), but itself represents information because it denotes information by being the contingent response it is. To the extent meaning and information are related, there is no meaning if we know. There is information if we learn.

In the end, a zero state of information is required for cultural systems to work. There are, of course, two possible zero states; one where no messages (which in our terms suggests no interactions), and one where all the messages are known and expected. The latter would necessarily be the zero information state for culture, by definition, once we had actually evolved culture. But likewise human culture requires contingency to operate. The trick is to identify the balance of contingency within which cultures (or more accurately, cultural beings) operate.

This is possibly one of the major points of misunderstanding between Evolutionary Psychology and Cultural Anthropology. Does EP explore some partially specified set of zero points, or does it indeed define some of the strategies for deviating from the zero point? Or does it, as some anthropologists claim, represent a different kind of currency altogether.

This is an interesting issue, and one that can be addressed based on evolutionary evidence. In looking at the development of intelligence in the hominins we have three kinds of phenomena that we can look for traces of, and possibly simulate some of the properties of.

First is the development of innate cognitive strategies. E.g. what phenomenal attractors have developed over time to benefit hominin populations? These would include the capacities needed for creating and reproducing tools. These would be abilities that were not just the simple product of learning, though they could be related to those in the second point. Second, is the incremental development of intelligence. This indicates abilities that can be recreated by individuals each generation with limited input from others

Third is the development of transgenerational knowledge. This may be simply a feature of one and two, but more likely depends of the development of some cognitive features beyond that.

What would be the nature of these 'innovations'? Not 'hard wiring' in the traditional sense, but some kind of tools for doing what we do. Thus violence need not be an inherent factor for humans, but we know how to do it and use it as a tool without education. But education can improve its use or absence of uses. Society can create situations where the violence tool is of limited or directed use or even counter-productive.

In a more ethnographic context we can use this paradigm to move away from attempting to attribute models to cultural agents that derive from either mechanically causal base (stochastic or not) or from a 'pure' logical base relying on some notion of truth and falseness.

Instead we can begin to work with describing models that are themselves adaptive because they rely on a metric of 'power'. Powerful knowledge is knowledge that works often enough to be useful - where entropy is reduced enough to predict at a useful rate, while remaining in sufficient quantity to apply to a range of situations. Some knowledge is very powerful, but can be directed to a limited number of contexts (such as treatments of specific infective disease). Other knowledge is less powerful, but can be used in a broad range of contexts (religious rites or divination for example). But if it is seen to be associated often enough with desired results, its power can be considered formidable just because it has some power and can apply broadly. This is an inherently adaptive form of representation, since different knowledges can be selected for and against in different contexts. Modelling entropy directs us to insight into just how powerful different knowledges are in given contexts, providing a vehicle for unifying research which depends on behaviours and physical contexts with research that directly examines the ideational systems that people apply to create or influences these.

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