1.1. Introduction

Traditionally, face to face negotiations in the real world have not been looked at as a complex systems interaction of actors that is dynamic and potentially emergent. If indeed negotiations are an outcome of a dynamic interaction of simpler behavior just as with a complex system we should be able to see the patterns contributing to the complexities of a negotiation under study. This paper and the supporting research sets out to show just this. This paper discusses the exploratory research based on negotiation simulations in which a large number of students were asked to participate as buyers and sellers. The student interactions were captured on video and a research method was conceived that attempted to look for patterns of interactions between actors using visualization techniques traditionally used to observe the algorithmic complexity of complex systems. Students were videoed negotiating with each other. Each video was tagged according to a recognized classification and coding scheme for negotiations. The classifications related to the phases through which any particular negotiation might pass, such as laughter, aggression, compromise, and so forth – through some 30 possible categories. Were negotiations more or less successful if they progressed through the alternative categories in different ways? Furthermore, were there emergent pathing segments in the data that were considered to be more or less successful? This focus on emergence within the data provides further strong support for face to face negotiations to be considered as complex systems.
1.2. Research Challenges and Literature Review

Our central proposition relates to exploring the concept of face to face (or marketplace) negotiation research in business from the perspective of complex systems and emergence. We believe that negotiations should exhibit emergent characteristics whether it be over the short or even long term with respect to military acquisitions or large corporate tenders. Traditionally, the negotiation research we have focused on is process based following a conventional negotiation cycle of opening, middle and closing. This can be seen no more clearly than in the definition “Business negotiation is the process of bargaining over a set of issues for the purpose of reaching an agreement” [Holmes 1991]. Furthermore, our literature review classifies this research into the following areas:

Accounting and auditing, education, social interaction and communication, marketing, behavior, accountability and time pressure, culture, conflict management, law as well as “e-” and automated negotiation.

In the area of complexity science and marketplace negotiation there is a paucity of published work and at this stage, there appears to be only one publication [Wheeler, 2002] covering our area of our interest.

A clear challenge of the research from the onset was to determine how the complex system of marketplace negotiations was to be represented. We wished to avoid what we saw as a failing of the traditional negotiation research to avoid capturing a single dimension e.g. process map. The more we considered these types of negotiations we recognized that:

a.) Buyer and seller especially in multi-body i.e. more than two player negotiations do not understand how the negotiation operates even if they have a process map.

b.) As an observer we will never have a perfect view of information since we cannot under normal circumstances look inside the minds of participants.

In light of this, we understood that the only representation of the negotiation was the negotiation itself or a comprehensive simulation. This is consistent with Kolmogorov-Chaitin complexity. We therefore decided the way to explore the complex system was to be ethnographic.

1.3. Research Methodology

1.3.1 Complex Systems Representation

From the onset, the desire was to utilize the ethnographic observation represented by the video footage to understand “what is actually going on in the negotiation?” The
research was conceived as being exploratory or investigative in nature rather than hypothesis driven. In effect, our desire was to see what the complex systems representations would tell us rather than imposing traditional beliefs.

An important aspect of the work was to break with the traditional process based approach that aims to answer questions of the nature “how many steps did it take to achieve the end result?” Rather than this, the researchers saw the potential in capturing the video footage in lieu of a traditional paper based ethnographic observation to help analyze and consider the negotiation process as being built upon an unstructured interaction between buyers and sellers.

The source of negotiations was course 24723 Business-to-Business Electronic Marketing [Young, 2002]. Furthermore, this course has a negotiation simulation in which students were asked to participate as buyers and sellers. Using these negotiations, an initial digital video footage of five negotiation sessions from this subject was captured as an initial research set against which to refine the research method. This content constitutes an actual ethnographic record of the student negotiations. The footage covered negotiations of two as well as three actors.

The video tapes of the sessions attempted to capture a negotiation in entirety. This content was isolated and recorded onto CD ROM media for ease of further editing and analysis. Subsequent steps created a complex systems representation of the negotiation.

### 1.3.2 Method

The Interpersonal Negotiation Coding Scheme [Campbell 1997] is ideally suited for the video coding strategy. It was seen as operating at the lowest possible level of communications between actors which suited the desire of the researchers. The coding schema is not process based but focused on the personal interaction between actors at a fundamental level. If indeed negotiations are an outcome of a dynamic interaction of simpler behavior just as with a complex system we should be able to see the patterns contributing to the complexities of the negotiation under study.
Patterns of Negotiation - A new way of looking at marketplace B2B Negotiations

A time code is inserted by a video editing software application at the beginning and end (if applicable) or just at the beginning of the observed behavior in accordance with the coding scheme.

The video segments need to be viewed over a number of times to pick up “what is actually going on” and therefore code the activities. At the highest level it is expected that the negotiation follows a communication process between normally 2 parties. Each player of the game does not automatically accept what the other party offers. At some stage during the negotiation you will witness conflict resolution, joint collaboration and a decision on a final outcome. Price may not be the only deciding factor. These macro events should also be recorded in terms of time code start & end.

Figure 2. Video segment coding

1.3.3 Related Visualization Software

Researchware’s HyperRESEARCH software was selected because of the ready ability to cope with video as well as other data types. It is a code-and-retrieve data analysis program with a hypothesis tester. This was used to conduct the pre-processing before analyzing the occurrence of any patterns to fingerprint the complex system.

Netmap Analytics software was used for visualization and exploratory pattern analysis. The Netmap software relative to any other similar application provides the most direct representation of a complex system as nodes and links. An Australian scientist, Dr John Galloway developed Node and Link Analysis (NALA) in the 1980's.

It has numerous features not seen in other packages including the ability to look at emergent data sets. That is those data sets that have more relationships between themselves then outside.
The bottom up representation of the negotiation as nodes and links considered the nodes as the participating actors with links denoting the observed behavior as represented by the coding scheme at the associated times.

### 1.4. Findings - Patterns of Negotiation

**Figure 3.** Sequential pathing patterns for all negotiation groups (in blue), showing the categories they pass through

**Figure 4.** Emergent pathing groups. These have been discovered by the Netmap software and each group is comprised of negotiations which have pathed though the categories sequentially in a very similar manner. Each group of groups has distinctive pathing. The pathing is very similar to each other if they belong to the same emergent group and different to each other if they belong in different emergent groups. This is essentially what the data is telling us from the bottom up.
1.5. Discussion and Future Research

The research to date has served to bring together a “demonstrator” that can take video based negotiations, create a complex systems representations and attempt to look for patterns of interactions between actors. The research needs to be extended to a much larger data set for it to demonstrate any practical value.

It is envisaged that if developed further such a tool could be of significant value in for instance, very large trade negotiations or the purchase of extremely complex industrial goods where there are a multitude of working groups that must come together to conclude an overall negotiation. The scenario of looking at trade talks such as Cancun starts to look more like a true complex system with a significant number of actors and behavior that is envisaged to be emergent. The unexpected outcome of the talks points to what we would expect of a complex system. Such a tool as described could be used for diagnostic purposes during the course of a negotiation alongside any traditional process based intervention techniques.

Other areas for further research consideration include the capture of physiological factors that can be collected automatically alongside the video capture to move towards a more complete representation of the negotiation as a complex system as well as synchronizing with a cognitive systems analysis.

References

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