

**CRISISCOM: A Computer Simulation**  
**of Selective Perception and Decision Making**

**(Oral Presentation)**

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Over the past year we have been attempting to build a model of the way humans process information about their relations with each other. As political scientists we are applying this model in an area of our special interest, international political systems. The model is dynamically represented within a digital computer, and has been constructed to utilize the advantages of computer time sharing.

This afternoon I would like to describe to you selected parts of the model and our first test.

The purpose of Crisiscom is to simulate national decision makers as they confront each other in a crisis. Crisiscom refers to communication in a crisis. The simulation is a dynamic model in which each decision maker :

1. Receives information about his environment.
2. Incorporates this information in ways which are a function of his own cognitive structure and of socio-psychological processes.

and

3. Generates new information.

In real world international communication systems, the information about which we are speaking is international news such as found in the New York Times. Examining the content of this news we would see that it is primarily information about international actors and the relationships among them. Our simulation, when completed, will represent the information processing capabilities of decision makers who initially receive a scenario of news, who digest this news, and who generate more news which in turn others incorporate, digest and generate, and so forth.

Within the Crisiscom system are subsystems which simulate a particular decision maker, or actor. These subsystems actually represent only the "cognitive system" of an actor. By the concept "cognitive system" we mean a person's structured picture of the actors and relationships he perceives in his environment, and the processes of incorporation and manipulation of the information from this environment.

The environmental information is described by a scenario. This scenario is a corpus of English sentences or messages, each stating a relationship between one actor and another. Each cognitive system receives some subset of the scenario messages. that is, not all actors receive all messages. Actors are thus said to be "selectively exposed" to the information generated within the system as described by the scenario.

Our concern is not with the psychological processes of human perception, but with the socio-psychological perception processes which operate on input messages. These processes of "selective perception" differentially weight the messages as they are received and bias them as they are integrated into the cognitive system. Thus the cognitive structure of each actor is not a perfect symbolic replication of his environment. Through selective exposure he does not receive all information from his environment and through selective perception he biases the information he receives.

There are constraints on the volume of information an actor's cognitive system can incorporate. He can "attend" to a limited amount of information during a given time. The amount of information to which an actor is exposed is assumed to be larger than the amount of information to which he can attend. This condition especially characterizes a crisis period, during which time large amounts of information are generated. As part of his selective perception, an actor must reduce his information input to a size he can manage in his "attention space".

Each cognitive system can be thought of as a set of cognitive elements and relationships among them. The elements and relations are represented in our simulation by simplified syntactic and semantic structures, and by socio-psychological relations.

The perception processes examine each new message to test its credibility. The syntactic and semantic relations of the message are compared with the actor's cognitive structure to determine whether the message makes sense.

#### DeGaulle Eats Cybernetics

is neither sensible to us nor to our simulated actor.

The socio-psychological relations we utilize are salience and affect.

Salience is a measure of the evaluation of importance of an element to an actor.

Affect is the positive or negative evaluation of an attitude of an actor toward an element.

Let us look at today's news, for example.

#### New York Times

Each cognitive system has a section denoted as the "attention space". In this space are kept the message elements and relations to which the actor is attending. The selection of messages for the attention space is a function of the message salience. In general, the most salient messages get into the attention space; however, information in the attention space has an additional inertia-like quality. Information already in the attention space tends to remain there if new input information is only slightly more salient than that in attention. The salience of new information must be larger than the present attention space information in order to replace this information. If a new message is associated with information already in attention, this new

message is added to attention, taking preference over information of higher salience. Input messages are associated semantically into classes. Messages having similar content are classified into a set called an event. For example, several messages concerning tariffs, coming from, and about Common Market decision makers might be classified as the event, Common Market Tariff Problems.

George Miller has hypothesized seven plus or minus two as the number of things to which a person can attend. We hypothesize that an actor attends to from five salient things to nine unimportant things; however, under conditions of extremely high salience as in a crisis, an actor may attend to as few as one thing. We consider the "things" in attention space to be events. Furthermore, if an event set contains many messages, the seven plus or minus two most salient messages have precedence if the event is in attention space.

It is interesting to note that in the "Major Events of the Day" in the New York Times there are invariably  $7\pm 2$  paragraphs describing the most salient events of the day, each having  $7\pm 2$  important points in them.

Several socio-psychological hypotheses relate the perception processes with the attention space structure. These hypotheses provide mechanisms for biasing the salience and affect evaluations. Since the criteria for entrance to attention space is a function of the salience of the messages, these biases influence the possibility of a message entering the attention space.

1. People pay more attention to information that deals with them.
2. People pay less attention to facts that contradict their views.
3. People pay more attention to information from trusted, liked sources.
5. People pay more attention to information that they will have to act on or discuss because of attention by others.
5. People pay more attention to information bearing on actions they have already taken, i.e., action creates commitment.

Our basic hypothesis about attention space is:

A person's cognitive structure is updated and altered by the information he attends to. Thus of all the information an actor receives only the contents of his attention space alter his cognitive structure.

In our first simulation our primary interest is in the five perception hypotheses and attention space mechanisms. A very limited cognitive structure of an actor is provided, consisting of affect and salience relations among twenty-four actors. The cognitive systems of only two of the actors, Decision Makers One and Two are simulated. The scenario is written by a person who supplies the salience and affect values.

Some messages, called "secret" only go to one of the two actors. Messages that get into attention space alter the affect relations in the limited cognitive structure.

The simulation is initialized by providing each decision maker with his perception of the affect and salience relations among the other actors. The simulation input is the scenario messages. The output presently is the contents of attention space, the remainder of the semantic-syntactic cognitive structure, and the new values of the affect relations.

Our first simulation is being tested on the crisis week before World War I. The scenario has about two hundred messages for each of the seven days of the week. The scenario was prepared from historical studies, newspapers of the day, and official documents of the period. The content of the scenario covers the broad spectrum of events of the period from jewel robberies to war mobilization. The Kaiser and the Czar are the two national decision-makers whose cognitive systems are simulated. At the end of each simulated day, the attention space and matrix of affect relations of the Kaiser and the Czar is provided for

the experimenter. By adjusting parameters of the perception processes, a distribution of attention spaces and affect matrices can be generated through running the simulation several times.

Scenarios of the Kennedy-Khrushchev Cuban Missile Crisis and of political science games having human participants are also in preparation for testing the simulation. By allowing intimate man-machine interaction through time-sharing, humans can interact as actors in the system. Numerous gaming possibilities as well as opportunities for decision makers to test decisions for their effect on the real environment are made available through this model.