

Communication Conflict

Frank Harary¹ and Mark F. Batell

*Research Center for Group Dynamics, Institute for Social Research,
The University of Michigan*

Communication conflict is described in terms of a graph theoretic model involving demiarcs. A classification of communication conflict situations is proposed leading to an analysis of the specific nature of communication breakdown. A hypothetical marriage counseling session is analyzed in the framework of this model.

COMMUNICATION CONFLICT

Inherent in the nature of conflict are the notions of opposition and incompatibility. Within the process of communication, there is always a potential element of conflict in the content of communication, and between the parties involved. Information theory (Shannon & Weaver, 1964) generally ignores these issues by speaking of distortion and entropy as related to a change in the amount of information transmitted, rather than its content. Taking context into consideration, Harary and Batell (1978) studied the concept of negative information. There, conflict occurs during the process of discerning the correct message from among a set of alternative possibilities. Our object is to reduce the problem to an even more basic level—before the message is actually transmitted or received. In order to accomplish this objective, we shall employ the techniques associated with the theory of demiarcs (Harary, 1971; Harary & Havelock, 1972; Havelock, 1969).

¹Requests for reprints should be sent to Frank Harary, Research Center for Group Dynamics, Institute for Social Research, The University of Michigan, Ann Arbor, Michigan 48106.

We begin our description of the demiarc model for communication conflict by reviewing some graph theoretic terminology (Harary, 1969). A *graph* is a nonempty set of *points* together with a collection of unordered pairs of distinct points called *lines*. A *digraph* or *directed graph* is a nonempty set of points together with a collection of ordered pairs of distinct points called *arcs*. An arc can be thought of as possessing an initial point from which the arc originates, and a terminal point to which the arc advances. In this way, each arc is decomposed into two *demi-arcs*, one going out from the initial point and the other coming in to the terminal point. These demi-arcs are called an *out-arc* and an *in-arc*, respectively. The relationship between arcs and demi-arcs is displayed in Fig. 1.

The unique point associated with a demiarc is termed its *referent*. In order to distinguish between the referents of a demiarc graph or demigraph, we label the point belonging to an out-arc its *transmitter* and the point belonging to an in-arc its *receiver*. The demi-arcs themselves may be labeled in any of several ways. The label could be a plus (+) or minus (-) sign as in signed graphs, a number as in networks, or a descriptive name or identifying label. This attached sign, number, or label are possibilities for the *type of message* or content of the communication. For clarity, we have adopted much of the terminology of information theory when describing the application of graph theoretic concepts to the situation of communication conflict.

With this graph theoretic terminology in mind, we proceed to describe various forms of conflict which may arise, following Harary (1971). Once

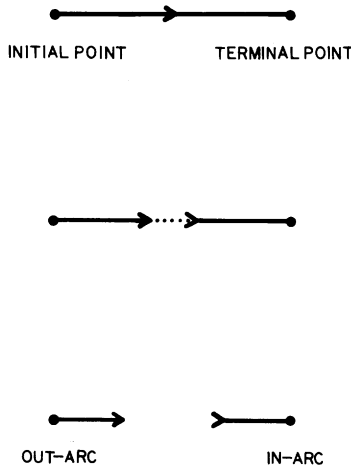


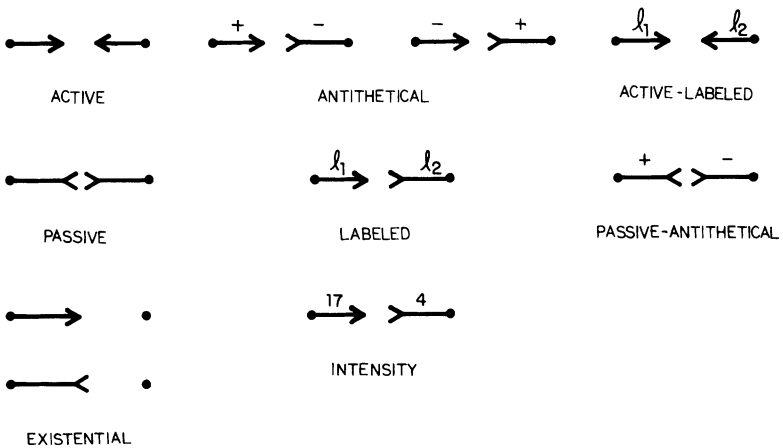
Fig. 1. Arcs and demi-arcs.

delineated, a graphical model for the types of communication conflict will be presented.

TYPES OF CONFLICT

Basic conflict is characterized in accordance with the notions of opposition and incompatibility. *Directional conflict* occurs whenever two demi-arcs of the same form oppose one another. *Content conflict* occurs whenever the message of the transmitter is incompatible with the message of the receiver. In the event that both directional and content conflict are operating in a situation, we say that *mixed conflict* occurs.

Examples of the three types of basic conflict are displayed in Fig. 2. The idea behind directional conflict relates to the form of the demi-arcs in that one demi-arc of each type is necessary to complete an arc. As illustrated in Fig. 2a, there are three distinct cases of directional conflict. *Active conflict* occurs whenever two out-arcs oppose one another. This kind of conflict might be a good model of the behavior of debating political candidates. Each is trying to impress the other with his own particular opinion without really listening to what the other person has to say. In the case of *passive conflict*, two in-arcs oppose one another. Passive conflict models the situation commonly found at college dances. Freshman men and



(A) DIRECTIONAL CONFLICTS

(B) CONTENT CONFLICTS

(C) MIXED CONFLICTS

Fig. 2. Basic conflict.

women spend most of the evening standing in a corner, looking at the opposite walls, wondering when some other person is going to ask them to dance. We call *existential conflict* the situation when only one demiarc is present. The unfulfilled quest of Don Quixote is one example of this situation.

In contrast to directional conflict, the failure to complete an arc in a content conflict situation is not due to the lack of one demiarc of each type, but rather because the message being transmitted is incompatible with the message capable of being received. Problems arise when the signs, numbers, or labels attached to the out-arc and in-arc are different. Figure 2b displays the three cases of content conflict. *Antithetical conflict* occurs whenever an out-arc of one sign is paired with an in-arc of the opposite sign. Such would be the situation of the eternal pessimist who cannot accept praise for a job well done, or the *prima donna* who rejects all criticism. When the receiver of an in-arc is predisposed toward a message of a particular kind (label #2, say) and the transmitter of an out-arc produces another kind of message (label #1), then *labeled conflict* occurs. As an example, consider the negotiation process between management and a union representative. Management can offer fewer work hours, more benefits, etc., but if the union is solely concerned with higher wages, then no message is communicated. Finally, it may be the case that the intensities associated with the two demiarc are different. When this happens, the special case of content conflict called *intensity conflict* has occurred. One such circumstance in which there is intensity conflict is the situation of two young lovers, one of whom is madly in love with the other, but the other person only mildly likes the first person.

It may happen that two out-arcs face each other and that, furthermore, these have different labels, as shown in Fig. 2c. Recall that when two or more kinds of conflict can occur simultaneously, mixed conflict is present. Another example of mixed conflict, also shown in Fig. 2c, has two in-arcs of opposite signs.

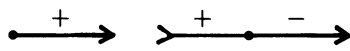
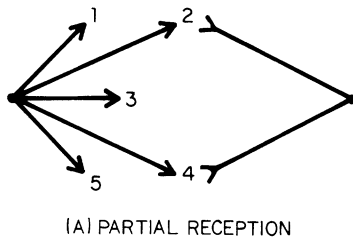
In essence, then, *communication conflict* occurs whenever two demiarc cannot combine to form a single arc. This may happen for any of the above reasons. A general characteristic of basic communication conflict is the total absence of communication. We wish to consider situations in which partial communication occurs, but in which the message undergoes some form of alteration during the process of transfer from the transmitter to the receiver. This situation we shall term *conflicting communication*.

In the case of conflicting communication, it is necessary to specify the initial point from which the original message is to be transmitted and the terminal point for which the message is intended, but arrives in altered

form. By definition, the situation in which a message is altered and then altered back to the original form before reaching its terminal point is not conflicting communication. However, changing the final destination may make it so.

A message can be considered terminated either when it is received by a point or when it is transmitted from a point. These two alternatives define the two types of conflicting communication. *Partial reception* occurs when a receiver demiarc is insufficient to accomodate the message as transmitted. *Absorption* takes place when the message is properly received, but all transmitter demiarcs of the terminal point are incapable of generating the particular message. Fig. 3 illustrates the types of conflicting communication. Empirically, partial reception models the situaiton in which a complex message consisting of several component messages is received in simpler form. For example, much information may be lost in the process of getting directions from a stranger. Absorption is a model for the situation in which the nature of a message changes during retransmission. Consider, for example, the brilliant professor who fully understands some piece of information obtained from a book or journal but is unable to explain it comprehensibly.

Before proceeding to the next section which deals more specifically with the demiarc model, we define two related concepts for the sake of completeness. A demiarc capable of transmitting any and all messages shall be termed a *universal donor*; a *universal acceptor* is defined dually.



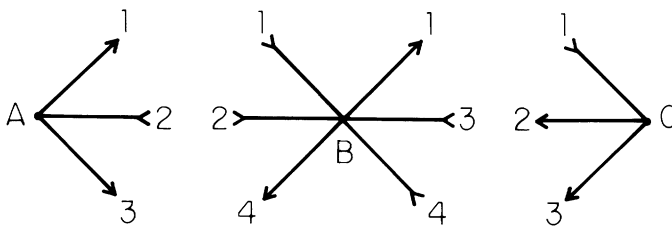
(B) ABSORPTION

Fig. 3. Conflicting communication.

MODEL

There is no simple way to describe a complex communication situation. In order to take into account every consideration, it is useful to construct a “transmitter matrix” and a “receiver matrix.” The rows and columns list each member point in the communication system. The entry in the (i,j) cell of the *transmitter matrix* lists the types of messages that can be sent from member point i to member point j ; the *receiver matrix* is defined dually. For example, if point A can transmit messages 1 and 3 to point B , then the (A,B) entry in the transmitter matrix would be 1,3. Figure 4 demonstrates the procedure for a three point communication system.

Envisioning the system as modeled by matrices allows several useful manipulations to be performed. One of the first questions that might naturally arise would relate to the matter of which messages can be communicated. From our matrix representation, it is a simple matter to determine the set of all communicable arcs in the system. For a given message m , an m -communicable in-arc occurs when point i can transmit message m to point j , and point j is capable of receiving message m from point i . The first condition is described by the transmitter matrix T , and the



	A	B	C		A	B	C
A	-	1,3	∅]	-	2	∅
B	4	-	1]	1,2	-	3,4
C	0	2,3	-]	0	1	-

TRANSMITTER MATRIX

RECEIVER MATRIX

Fig. 4. A 3-point communication system and associated matrices.

second condition is described by the transpose of the receiver matrix R^t . Therefore, the matrix resulting from the intersection of T with R^t represents all completable arcs. Denote this intersection matrix by C , and we have $C = T \times R^t$. At this point, the adjacency matrix of a digraph (Harary, 1969) and its powers may be invoked to trace the path of a message through the system.

The matrix representation also enables us to depict other aspects of conflict. For example, the active conflict situations are given by the matrix $T \times T^t$; the passive conflicts by $R \times R^t$. Content conflict is described by the matrix $(T \times R^t) - (R \times T^t)$. By analyzing these matrices, we can determine the alterations which must be made in order to communicate a given message from point i to point j . It may be the case that we need only change or insert a single transmitter or receiver strategically. In this way, we become aware of the nature of a communication problem, and also of the method by which it may be removed.

In the next section, we present an example illustrating the use of the demiarc model. We describe a hypothetical session with a marriage counsellor within the framework of the graph theoretic model presented above.

HYPOTHETICAL EXAMPLE

One possible area in which this demiarc approach to communication may prove useful is in the area of counseling. Consider the following hypothetical conversation between a husband, wife, and their marriage counsellor. We will assume that the counsellor has asked the couple for a sample of typical conversation at home. Atypically, they respond with the following in which H is the husband, W the wife, and the therapist T just listens:

- (a) H : I think we'll go up North this year. I love to fish.
 W : I'd like to go somewhere warm like Florida.
 H : I haven't been fishing in years.
 W : The ocean the beach, lying around in the sun.
 H : Maybe Minnesota, or Wisconsin. Maybe even Canada.
- (b) H : Things at work were awful today. I didn't get the job done on time, so the boss chewed me out. Always it's me who gets the jobs that have to be done yesterday.
 W : Is it too much to ask for a little help around the house?
- (c) W : You used to come home and give me a hug and a kiss. Now all you ask about is dinner.
 H : If only you'd take the initiative once in a while.

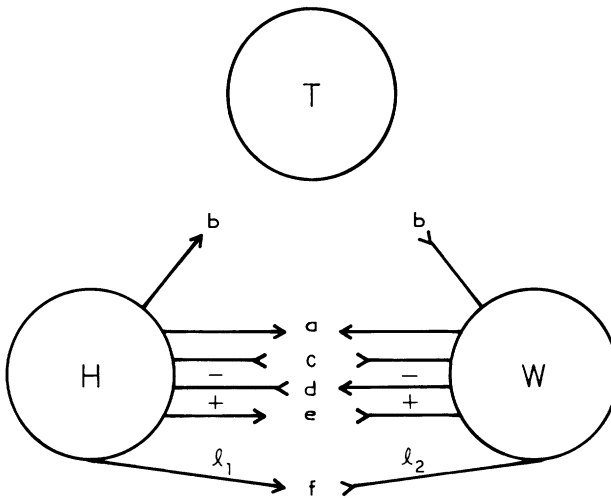


Fig. 5. A demiarcal representation of the hypothetical conversation.

- (d) *W*: It's all right honey, all men have trouble sometimes.
H: I never used to have any trouble. Women used to admire me for my animal passion and stamina.
- (e) *H*: You're wearing too much make-up again.
W: It's my face. Other people tell me I look O.K.
- (f) *H*: I wish you'd quit spending so much money all the time. If it isn't a new dress, it's new shoes. Always spending.
W: Me? What about those golf clubs you just got? I'd understand it if we were poor, but what's fair for the gander is fair for the goose.

This conversation is diagramed in Fig. 5. The six segments, labeled (a) through (f) in the text, correspond directly to the demiarcs in the figure. Upon examination, (a) is seen as an example of active conflict, (b) shows existential conflict, (c) passive conflict, (d) and (e) antithetical conflicts, and (f) labeled conflict. At this point, after having identified various barriers to communication, the therapist would attempt to manipulate the conversation in order to complete the appropriate arcs. Our classification procedures serve to point out exactly which changes are necessary.

UNSOLVED PROBLEMS

How many times can a given message be transmitted or received? A woman might be pleased to receive a message containing a proposal of

marriage from several different men, but not all at the same time. Receiving the first one and accepting it precludes receiving any more. Similarly, once accepted by a particular woman, further proposals of marriage by the man are not likely to be made. Restrictions of this sort are beyond the scope of this paper.

In Harary and Havelock (1972) several compatibility conditions for successful communication were proposed. We have concentrated here on a typology of conflict in the message to be sent. Similarly, conflict can also occur in the other conditions which are required to complete a communication arc, such as proximity and simultaneity. A more thorough analysis of communication conflicts could include these and other sources of difficulty.

REFERENCES

- HARARY, F. *Graph theory*. Reading: Addison-Wesley, 1969.
- HARARY, F. Demiarcs; An atomistic approach to relational systems and group dynamics. *Journal of Mathematical Sociology*, 1971, 1, 195-205.
- HARARY, F., & HAVELOCK, R. Anatomy of a communication arc. *Human Relations*, 1972, 25, 413-426.
- HARARY, F., & BATELL, M. F. The concept of negative information. *Behavioral Science*, 1978, 23, 264-270.
- HAVELOCK, R. *Planning for Innovation Through Dissemination and Utilization of Knowledge*. Ann Arbor: Institute for Social Research, University of Michigan, 1969.
- SHANNON, C. E., & WEAVER, W. *The mathematical theory of communication*. Urbana: University of Illinois Press, 1964.

BIOGRAPHICAL NOTES

FRANK HARARY has been in the mathematics department of the University of Michigan since 1948 and with its Institute for Social Research from 1950. He is accordingly happy that his first honorary doctorate (Aberdeen, 1975) was in mathematics and his second (Lund, 1978) in social science. He was fortunate in spending 1962-1963 at the Tavistock Institute with Eric Trist, 1966-1967 at the London School of Economics, 1973-1974 in Oxford and looks forward to 1980-1981 in Cambridge. He founded the *Journal of Graph Theory* in 1977 and is also on the editorial board of nine other journals, including the new *Mathematical Social Sciences*. His current research is on achievement and avoidance games and their relation with Gestalt psychology.

MARK F. BATELL graduated Phi Beta Kappa from Knox College in Galesburg, Illinois with a BA in mathematics and psychology. He received Master's degrees in mathematics and psychology, both from the University of Michigan in Ann Arbor where he is a candidate for a PhD in mathematical psychology. His wife, Kathryn, was recently ordained and serves as Assistant Pastor at St. Michael Lutheran Church in Canton, Michigan.