Analyses of self-disclosure behavior under multiple conditions of social isolation and confinement replicated earlier findings and generally confirmed hypotheses derived from social penetration theory. Major findings link self-disclosure to environmental parameters and interpersonal friction. In the Privacy without Stimulation condition, Ss possibly attempted to cope with this austerity by engaging in verbal exchanges which, doubtlessly, decreased social distance between pair-members and resulted in greater disclosure breadth at high intimacy levels. Stimulation in the No-Privacy groups probably mediated verbal exchanges by reminding Ss of past experiences. However, the especially close interaction forced by the No-Privacy manipulation tended to encourage guardedness; while groups in Privacy with Stimulation exhibited the least amount of disclosure due to being physically separated, especially those under Long Mission Expectations. Findings have broad implication for exchange theories and can be useful in training men to adapt to isolated and confined situations. (Author)
Self-Disclosure in Isolated Groups

Dalmas A. Taylor
University of Maryland

In a recent study of groups in social isolation, Altman and Haythorn (1965) found that (1) isolated Ss revealed more about intimate topics to their partners than did control Ss, and (2) the level of intimacy achieved by isolates was comparable to that for close friends, whereas the level for control Ss in intimate areas was comparable to that for casual acquaintances. The interpretation of these data suggested that conditions of social isolation promote interpersonal exploration as instrumental acts. That is, engaging in interpersonal exchanges helped to pass the time, generated a more enriched environment, and permitted Ss to learn more about others with whom they were inextricably involved.

Jourard (1964) has suggested that openness, within limits, can be mutually rewarding in interpersonal relations; whereas, Altman and Taylor (1970), in delineating a theory of "social penetration", argue that reciprocal disclosures, in relationship formation, are orderly, systematic, and occur gradually, reflecting a general caution as regards openness. Violations of this orderly process of development have implications for the stability and viability of relationships. Relationships not characterized by a great breadth of experience (long stable history of

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reward/cost outcomes) should not be able to handle stress and other costs as well as relationships that have long histories of working through a wide range of experiences.

In a study of college roommates, Taylor (1965, 1968) found that pairs who were both high revealers (to target best friend) engaged in a significantly greater amount of social and verbal exchange than did pair composed of low revealers. It was also discovered that, over time, high revealers came to dislike one another. Newcomb (1961) explains a similar result by suggesting that initial estimates of attraction are autistic. Because of a need or desire to be compatible in a roommate situation, individuals tend initially to overestimate the favorableness of the relationship. Such an overestimation in turn probably leads to a hasty and unhealthy over-exposure of one's self.

The interpersonal difficulties experienced by members of isolated groups have been well documented (Nardini, Hermann, and Rasmussen, 1962; Rohrer, 1961; Taylor, Wheeler, and Altman, 1968; Taylor, Altman, Wheeler, and Kushner, 1969; Weybrew, 1961). The environmental presses of isolation and confinement seem to accentuate and/or accelerate interpersonal involvement which may contribute to the difficulties noted in these unusual environments; that is, too rapid a rate of self-disclosure can often result in a feeling of vulnerability, which in turn becomes a source of interpersonal friction.

This study will attempt to extend the Altman-Haythorn findings by exploring variations in environmental events and the impact these variations have on the social penetration process. Taylor (1968) studied the
developmental history of dyads in a more natural longitudinal setting. Here, we will examine the development of social penetration under the more rigorously controlled conditions of the laboratory and in a more compressed time frame. Additionally, we will explore the relationship between predispositions to reveal and dyadic adjustment in confinement. It was expected that dyads composed of two high revealers would engage in great amounts of self-disclosure than would dyads composed of low revealers. Disclosure behaviors deviating from this pattern should result in group friction, possibly leading to early termination of the mission. Developmental changes in intimate vs. non-intimate areas should yield results consistent with earlier findings that greater differences in exchanges as a function of personality or reinforcement occur in intimate as opposed to non-intimate areas (Altman and Haythorn, 1965; Frankfurt, 1965; Taylor Altman, and Sorrentino, 1968, 1969). Finally, we are interested in whether differentially stressful conditions of isolation will have different effects on self-disclosure.

Conditions of social isolation were manipulated so as to create (1) privacy, determined by two men living either in one room or in two adjoining rooms with free access between them, (2) stimulation, determined by groups having or not having various forms of enrichment and verbal contact with persons outside the experimental chambers, and (3) mission-length expectation, or whether groups expected to be isolated for relatively short periods (4 days) or relatively long periods (20 days). It was found that privacy, stimulation, and short missions yielded the fewest stress reactions, whereas groups in a privacy condition expecting
long missions, and having no outside stimulation were most stressed and debilitated (see Taylor, Wheeler, and Altman, 1968; Taylor, Altman, Wheeler, and Kushner, 1969).

METHOD

Subjects

Ss were 18 to 20 year old volunteers who had just completed boot training at the Great Lakes Naval Training Center. Pair-members were selected such that they were roughly equated for age, religion, I.Q., education, and other demographic variables. Ss assigned to pairs were strangers and were kept apart during two days of training so that their relationship could not begin until they were placed in confinement. During training, measures of self-disclosure (to targets best friend and casual acquaintance) were included in a battery of tests designed to assess personality, cognitive abilities and biochemical indices.

Procedure

In half the group, Ss had separate rooms at their disposal (Privacy condition; the other half lived in one room (Non-Privacy condition). Both rooms in the Privacy condition, and the single room in the Non-Privacy condition were similar in size and were furnished identically. In the Privacy conditions, pairs could be together at all times except for sleeping and for executing certain tasks.

A Stimulation manipulation permitted an examination of the impact of voice contact and other "outside" experiences on interpersonal exchanges. Ss in the Non-Stimulation condition did not hear another human voice except in two task situations. All other communications...
from the mission control center were given with a tone and buzzer code system. In contrast, Ss in the Stimulated condition received verbal instructions to perform all tasks, were asked to report room temperature and food consumption periodically, and received three 5-minute broadcasts of rock-n-roll music, an outdated Huntley-Brinkley documentary record, and a series of questions and answers taken from the Playboy Advisor column dealing with sports, law, etiquette, hobbies, foods, etc. These broadcasts were scheduled such that a minimum of 4 or 5 hours intervened between each.

After the isolation period had begun, half the groups were told that the mission would last 4 days and the remaining half were informed that the mission would last 20 days. The planned duration of all missions was 8 days, but all groups were told that the mission might be extended "because of operational requirements". Due to noises from the building and adjacent parking lot, Ss were able to discern somewhat the passage of time.

At the end of 4 days, no announcement was made about the mission being extended. Since most Ss in the 4 day condition knew when 4 days had passed, they experienced a high degree of uncertainty beyond this time. Because Ss in the 20-day groups expected to be together for a long period of time, it was hypothesized that they would be guarded about their interpersonal disclosures. This caution should result in moderate levels of disclosures and less interpersonal tension for 20 day groups as opposed to 4 day groups.
Self-Disclosure Measures

A questionnaire for measuring self-disclosure to target persons "best friend" and "casual acquaintance" was developed from an item pool of approximately 700 statements, described in an earlier report by Taylor and Altman (1966). Forty-eight items dealing with personal information about the self were selected so as to reflect 12 topical categories and 3 levels of intimacy. Level of intimacy was operationally defined as a function of Thurstone scale values as follows: low intimacy (1.00-4.25), medium intimacy (4.26-6.59), and high intimacy (6.60-11.00). This construction permitted the assessment of the total amount of disclosure (breadth) and intimacy level of that disclosure (depth). Prior research indicated that a greater amount of exchange occurs at low levels of intimacy as opposed to high intimacy levels, and that the rate of development is greater at low intimacy levels.

Prior to confinement, each S was asked to indicate how many of the 48 items contained information that he had revealed to his (1) best friend and (2) casual acquaintance. On the basis of disclosure to best friend, Ss were classified as either high or low revealers.

All Ss individually completed prepackaged questionnaires on days 1, 3, 5 and 7 upon instruction from the mission control center. The self-disclosure questionnaires in these packages required Ss to indicate information they had revealed to their partners during confinement. Upon termination of the mission, either through abort or successful completion, Ss completed a final set of questionnaires among which was a self-disclosure inventory for target "partner".
RESULTS

A factorial analysis for Mission Length x Stimulation x Privacy with repeated measures on days was performed first on total amount of disclosure to partner and subsequently on disclosure to partner at three levels of intimacy. Results of the first analysis indicated only a significant main effect for Days ($F = 51.19, p < .0001$). Examination of the means associated with this main effect (see Figure 1) by Duncans

Insert Figure 1 about here

Multiple Range Tests showed that the amount of personal information revealed to partners throughout confinement significantly increased in all groups. While this is not a profound finding, these data replicate earlier findings by Taylor (1968), Frankfurt (1965) and Taylor, Altman, and Sorrentino (1969). More importantly, however, is that the greatest amount of disclosure to partner was roughly equal to amount of disclosure to target casual acquaintance. This finding was also obtained by Altman and Haythorn (1965).

The analysis by level of intimacy indicated not only a significant main effect for days, but a main effect for intimacy ($F = 109.08, p < .0001$). Means associated with a significant level of Intimacy x Days interaction ($F = 11.27, p < .001$) indicated that breadth of disclosure increased at a more rapid rate over days for items associated with lower intimacy levels than for those of higher levels (see Table 1). Terminal amounts of disclosure at high intimacy levels are comparable to Initial...
amounts of disclosure at low levels. This, the difference in breadth of disclosure between levels showed greater disparity over time, with greater increases occurring at low levels of intimacy. This finding provides confirmation of the "wedge-like" notion of development which, according to Altman and Haythorn (1965) and Altman and Taylor (1971), is an inverse relationship between breadth of disclosure and level of intimacy and is a perfect replication of a similar finding on college roommates (see Frankfurt, 1965; Taylor, 1968).

A higher order interaction of the three experimental conditions with Days and level of Intimacy indicated that breadth of disclosure at various levels of intimacy differed among the experimental conditions over time. Means associated with this complex interaction Mission Length x Stimulation x Privacy x Days x Intimacy (F = 2.68, p < .002) are presented in Figures 2 through 4.
As expected, disclosure at high intimacy levels was quite low (Figure 2). Despite expected mission length, greater amounts of disclosure occurred under conditions of Privacy with No-Stimulation and No-Privacy with Stimulation. This difference was more pronounced in the 20 day groups where Ss in the Privacy condition with Stimulation disclosed very little to one another.

As can be seen in Figure 2, all groups increased in breadth of disclosure from day one to day three. However, all Stimulation groups and groups under conditions of 4 Day Expectations, Privacy and No-Stimulation tended to level off after day 3. All groups, except the Privacy No-Stimulation groups, showed some post-confinement elevation in amount of disclosure at high intimacy levels.

Inasmuch as the Privacy condition without Stimulation provided the least amount of enrichment, Ss possible attempted to cope with this austerity by engaging in verbal exchanges which, no doubt, decreased social distance between pair members and resulted in greater breadth of disclosure at high intimacy levels. Stimulation in the No-Privacy groups probably mediated verbal exchanges by reminding Ss of past experiences. The especially close interaction forced by No-Privacy probably resulted in Ss being more guarded, but this seems to have been countered by the tape-recorded Stimulation. The tendency of Stimulation to facilitate interpersonal exchanges is minimized by the ability to be
in physically separate compartments. Hence, groups in Privacy with Stimulation exhibit the least amount of breadth of disclosure in intimate areas, especially those under 20 Day Mission Expectations.

Although greater amounts of disclosure occurred at medium levels of intimacy than at high levels of intimacy, differences among experimental groups were not as pronounced (see Figure 3). However, greater extremes did occur in the 20-Day conditions. Privacy groups without Stimulation exhibited the greatest amount of disclosure, and No-Privacy groups with Stimulation maintained extremely low amounts of disclosure with a slight decrease after confinement. Fewer differences were perhaps obtained because of the equivocal nature of intimacy at this level. In individual cases, many items could be considered either high or low in intimacy. Hence, interpretations at this level of intimacy must necessarily be more vague than at high or low levels of intimacy.

As can be seen in Figure 4, the greatest breadth of disclosure occurred at low levels of intimacy. Again, however, differences between experimental conditions were more pronounced for 20-Day Mission Expectation groups. The effect of Stimulation on No-Privacy groups varied according to Mission Expectation. Groups in the 20-Day No-Privacy Stimulation condition exhibited the least amount of disclosure, whereas the greatest breadth of disclosure, at low intimacy levels, was achieved under the 4-Day No-Privacy Stimulation condition. Among the 20-Day groups, from day 3 throughout confinement, groups without Stimulation exhibited increasingly greater amounts of disclosure than the Stimulated groups. This difference was not at all influenced by the Privacy manipulation.
<table>
<thead>
<tr>
<th>Day</th>
<th>1</th>
<th>3</th>
<th>5</th>
<th>(7)*</th>
<th>Post</th>
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<tr>
<td>Mean Disclosure</td>
<td>2.86</td>
<td>7.64</td>
<td>10.30</td>
<td>(11.25)</td>
<td>11.27</td>
</tr>
<tr>
<td>n</td>
<td>44</td>
<td>44</td>
<td>44</td>
<td>(32)</td>
<td>44</td>
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Table 1

* not utilized in analysis;

(n) includes remaining subjects subsequent to Day five.
## Analysis of Variance Summary Table

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<th>df</th>
<th>MS</th>
<th>F</th>
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<tr>
<td>Aware (B)</td>
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<td>A X B</td>
<td>1</td>
<td>32.0059</td>
<td>1.039</td>
</tr>
<tr>
<td>Privacy (C)</td>
<td>1</td>
<td>2.4027</td>
<td>0.078</td>
</tr>
<tr>
<td>A X C</td>
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<td>14.1275</td>
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<td>B X C</td>
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<td>18.4999</td>
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<td>Days (D)</td>
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<td>51.197****</td>
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<td>0.339</td>
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</tr>
<tr>
<td>B X C X E</td>
<td>2</td>
<td>9.4418</td>
<td>3.188**</td>
</tr>
<tr>
<td>SOURCE</td>
<td>df</td>
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<td>F</td>
</tr>
<tr>
<td>--------</td>
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</tr>
<tr>
<td>A X B X C X E</td>
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<td>4.954***</td>
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<tr>
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</tr>
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<td>2.8365</td>
<td>2.681***</td>
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<tr>
<td>SWG</td>
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<tr>
<td>D X E X SS</td>
<td>216</td>
<td>1.0581</td>
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</tr>
<tr>
<td>W. CELL</td>
<td>432</td>
<td>4.5047</td>
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</tr>
<tr>
<td>TOTAL</td>
<td>527</td>
<td>7.1657</td>
<td></td>
</tr>
</tbody>
</table>

**** p < .00001

*** p > .02

** p > .05

* p > .10
Table 1. Mean Amount of Disclosure (Breadth) Per Level of Intimacy

<table>
<thead>
<tr>
<th>Intimacy Level</th>
<th>Days</th>
<th>1</th>
<th>3</th>
<th>5</th>
<th>Post</th>
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</thead>
<tbody>
<tr>
<td>High</td>
<td></td>
<td>.30</td>
<td>1.27a</td>
<td>1.61ab</td>
<td>1.93b</td>
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<td>Medium</td>
<td></td>
<td>.82</td>
<td>2.50</td>
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<tr>
<td>Low</td>
<td></td>
<td>1.75b</td>
<td>3.86</td>
<td>5.41d</td>
<td>5.68d</td>
</tr>
</tbody>
</table>

1All mean differences not sharing a common subscript are significant at the .01 level by Duncan's Multiple Range Test except day 1 means for high vs. medium intimacy which are significant at the .10 level. Mean pairs having common subscripts do not differ significantly.
Perhaps the pacing mechanism displayed by long-mission groups is helped by the introduction of Stimulation. In summary, confirmation of the inverse relationship between breadth of disclosure and intimacy level was demonstrated. Groups without Stimulation generally exhibited continuously increasing amounts of disclosure, whereas Stimulation groups in most cases tended to level off after day 3. These findings were more pronounced for Long Mission (20 days) Expectation groups.

Predisposition to Reveal and Mission Completion

Two additional types of analyses were performed: (1) In order to investigate the relationship between disclosure to partner and ability to complete the mission, separate analyses of variance utilizing each experimental condition in combination with mission completion were performed. (2) In addition, composition effects, determined by predisposition to reveal to target person "best friend" were partitioned as a further source of variance. The first type of analyses failed to yield any differences between aborters and completers. In the second set of analyses, dyads were categorized as high, and low revealer composition groups.

Previous studies (Altman and Haythorn, 1965; Frankfurt, 1965; Taylor, 1968) have repeatedly demonstrated questionnaire measures of self-disclosure to target best friend as a reliably stable predictor of self-disclosure to novel target persons in both real (to college roommates) and laboratory implemented social interaction situations. Subjects categorized as high disclosers (to target best friend) disclose more to
novel targets than do subjects designated as low disclosers (to target best friend). Further, Taylor and Oberlander (1969) demonstrated that this high-discloser/low-discloser distinction is a function of high disclosers being more sensitive to the selection and recognition of person-oriented stimuli than are low disclosers.

We hypothesized that marked deviations from baseline measures of self-disclosure (to target best friend) would be symptomatic of or concomitant with group processes leading to unsuccessful mission completion. Low revealers who "overdisclose" as well as high revealers who "underdisclose" were expected to exhibit a greater incidence of unsuccessful mission completion.

An initial finding here that confirms results from other studies can be seen in Figure 5. A significant Disclosure × Days × Intimacy interaction (F = 2.53, p < .02) indicates an inverse relationship between amount of disclosure and level of intimacy. Rate of increase of disclosure to partner was greatest at superficial levels. More importantly, however, is that at each level of intimacy high disclosers revealed more to their partners than did low disclosers. Additionally, the differences over days between high and low disclosers became more disparate at increasingly higher levels of intimacy. All mean comparisons in this interaction were in the predicted direction, and with few exceptions were statistically significant as indicated by Duncan's multiple range tests.
A Disclosure x Days x Abort Interaction ($F = 2.84, p < .04$) provided confirmation of the hypothesis that disclosure patterns that denote from baseline assessments are indicative of maladaptive attempts to deal with the stresses of social isolation. The data in Figure 6 show that by the first day of confinement, subjects who would eventually abort had achieved a greater breadth of disclosure than subjects who completed the mission. Breadth of disclosure increased for all subjects, and the relationship between high revealers and low revealers who completed the mission was as expected. Among the completers, high revealers not only disclosed more about themselves, but their rate of increase over days was much greater than that for low revealers. Among aborters this relationship did not hold. Low revealers' rate of increase was comparable to that for all high-revealer subjects, with terminal amounts of disclosure for low-revealer abort groups being reater than that for high-revealer abort groups.

Means from a significant Disclosure x Days x Intimacy x Abort interaction ($F = 2.14, p < .05$) provided a more detailed examination of the maladaptive attempts at coping with the stresses of social isolation. Figures 7, 8, and 9 indicate the breadth of disclosure over
days for high-revealer and low-revealer abort and completer groups at
high, medium, and low levels of intimacy, respectively. At each level
of intimacy, the relationship between high-revealer and low-revealer
completer groups conforms to earlier findings (Frankfurt, 1968; Taylor,
1968). High revealers exhibit greater amounts of disclosure than low
revealers at each level of intimacy; the rate of development for both
groups is greater at superficial levels of intimacy, with high and low
revealers achieving the greatest breadth of disclosure at low levels
of intimacy (see Figure 9). A further finding indicates that the
greatest amount of disparity, during the latter days of confinement,
between high and low revealers is at the high level of intimacy. This
result replicates data reported by Frankfurt (1965), which was discussed
earlier in this paper.

Further examination of Figures 7, 8, and 9 reveals the deviant
disclosure patterns of abort groups, especially at medium (Figure 8)
and low (Figure 9) levels of intimacy. In both instances, low revealers
who aborted exhibited greater breadth of disclosure than all other groups.
Since the direction of causality cannot be determined, we can only conclude
that the presses of the isolated environment that produced sufficient stresses to cause these groups to abort resulted in low revealers engaging in abnormally high amounts of disclosure to their partners. The pattern for high revealers that abort is somewhat different, although again, the deviations for these subjects are more pronounced at medium and low levels of intimacy. In both instances, high revealers that exhibited greater amounts of disclosure than any other group on the first day of confinement. Perhaps subjects who are predisposed to reveal a lot about themselves overestimate the favorability of the situation and their partner and thereby engage in too rapid a rate of interpersonal exchange. In time, they probably make a more realistic appraisal of the situation, but too late to avoid the costs incurred by the unrealistic assessment. By day three, the rate of exchange for high-revealer groups decelerated.

**DISCUSSION**

In summary, we have demonstrated and replicated several important findings relevant to the theory of social penetration, one of the most important being that opportunities to interact produced increasingly greater breadth of disclosure over days. Further examination of this phenomenon indicated that breadth of disclosure is inversely related to level of intimacy; that is, greater breadth of disclosure occurred at superficial levels, and the disparity between levels was greatest at the high level of intimacy.

Differences produced among experimental conditions indicated that these findings were more pronounced among 20-day groups. In addition,
greater breadth if disclosure occurred under conditions of no stimulation, but abated in conditions with stimulation.

Analyses of predisposition to reveal and actual disclosure during confinement demonstrated a relationship between mission completion and breadth of disclosure to partner. High revealers disclosed more to their partners, over days, than did low revealers at each level of intimacy. These differences were more pronounced, however, at high levels of intimacy. Finally, aborters, whether high revealers or low revealers, deviated from the disclosure patterns of completers. Completer-groups had disclosure patterns that conformed to earlier findings and theoretical predictions; however, low revealers who aborted overdisclosed to their partners while high revealers who aborted exhibited less than normal amounts of disclosure to their partners.

These data go beyond those provided by Aitman and Haythorn (1965) in facilitating the development of the social penetration framework. Combinations of environmental properties in addition to personality (group) composition were shown to affect self-disclosing behaviors in ways not demonstrated before. The Aitman-Haythorn study cited above obtained only pre-post measures of disclosures from men confined to isolation for ten days. Taylor (1938) was able to study self-disclosing behaviors longitudinally. However, because of the naturalistic setting (college roommates) in which the study occurred, environmental parameters could not be manipulated nor was it possible to follow systematically pair-members who dropped out before the study was completed. The present study provides confirmation for many of the basic notions of social
penetration -- especially those dealing with mediational events. It is clear from these data that various facets of the physical environment as well as interpersonal compatibilities modify significantly the social penetration process. Elsewhere (Altman, Taylor, and Wheeler, 1971), we have discussed how the physical environment and group-formation processes facilitate adjustment. Members of ineffective or abort groups (those who left the situation prior to termination of the study) did not go about the job of group formation and member acculturation with one another as did groups who successfully completed the mission. We can now add another dimension to this syndrome. Disclosure levels that deviate from baseline assessment are out of synchrony with good group formation processes and are therefore maladaptive.

Social penetration theory postulates that intimacy must be learned gradually and inductively which suggests that "immediate intimacy" is most atypical. Data obtained here, however, adds specificity to this formulation. Optimum rate of development seems to be a function of the personalities of the two individuals concerned. Thus, the optimal rate of development may be high for individuals who demonstrate the preconditions to reciprocity of openness, empathy, and willingness to risk rejection. Conversely, individuals for whom preconditions are classified as relatively closed, guarded and defensive, rates of development in an interpersonal context would be predictably low. Further research to specify these parameters as well as non-verbal indices in this process seem indicated.
REFERENCES


Figure 6. Amount of Disclosure for High and Low Revealer Dye 15 among Abort and Completer Groups

- Completers
- Aborted

Breath of Disclosure

1  2  3  4  5  6  7  8  9  10  11  12  13  14

Days

28  3  5  POST
Figure 7: High Intimacy Disclosure for Abuters and Completers Groups.

Legend:
- - - - Completers
- - - Abuters

- - - High Revealers
- - - Low Revealers

Breadth of Disclosure

30 Days

PRET
Figure 8. Medium Intimacy Disclosure for Abortion and Complete Groups.
Figure 9. Low Intimacy Disclosure for Abolter and Completer Groups.

- Completers
- Abolters

- High Revealers
- Low Revealers

- High Revealers

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