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A Comparison of the Evolution and Entropy of Responses to Picture Choices on an "Absurdum Questionnaire" between Members of Two Different Training Groups

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ABSTRACT

The results of previous studies on a group-training program for group therapists supported the influence of group dynamics on the members' individual choices of pictures presented to them in an "absurdum questionnaire." The present analysis compared the responses obtained from previous studies with those from a group of psychiatric caregivers training to prevent and manage aggression of hospitalized patients. The evolution of the number and entropy of the responses to the picture choices were compared. The group analysis program was conducted at the Basque Foundation for the Investigation of Mental Health in Bilbao, Spain. The Preventive Approach and Controlled Intervention program for the prevention and management of aggression was held in Geneva, Switzerland. Data were collected from the participants in the group-analysis program during their 11 sessions of training and from those in the aggression prevention and management program during three days of a series of four-day courses. The participants were presented with an "absurdum questionnaire" containing 50 pairs of images, and were asked to choose one image from each pair. The evolution of the number of answers was not significantly different between the two training groups. The evolution of entropy revealed a clear difference with a gradual increase in the group-analysis program, and a decrease in the aggression-management training group. We interpret this difference in light of Bion's view of group dynamics, with the group-analysis training being driven by Bion's basic assumptions and the aggression-management training by Bion's work group.

Key Words: group analysis; psychophysics; jungian psychology; bion's basic assumptions; entropy

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Introduction

In two previous analyses (Trojaola-Zapirain *et al.,* 2014; 2015), we presented evidence of the effects of the group situation on the behavior of participants confronted with questions requiring them to choose between pictures arranged in pairs. In the present study, we extend these results by administering the same questionnaire to a group of caregivers for psychiatric patients during their training on the prevention and management of aggression in the hospital setting.

The present study compares the evolution of the number and entropy of the responses of group members in two different studies. The first study (Trojaola-Zapirain *et al.,* 2014) was performed during group-analysis training for group therapists at the Basque Foundation for the Investigation of Mental Health (OMIE) in Bilbao, Spain. The second study (Trojaola-Zapirain *et al.,* 2015) was conducted during the Preventive Approach and Controlled Intervention (APIC) training for the management of aggression for psychiatric caregivers, in Geneva, Switzerland.

As explained in a previous paper of ours (Trojaola-Zapirain *et al.,* 2015), according to Bion, the evolution of the group is governed both by what he calls universal "basic assumptions" and by the conflicts that are rooted in the contingent reality of each specific group (Bion, 1961; Vergopoulo, 1983; Foulkes, 1961). Bion identified three basic assumptions describing the underlying workings of human groups: dependency, fight-flight, and pairing (Bion, 1961). The primary aspiration of each group is to find safety and protection in one special individual in the group (the group leader or conductor), which leads to what Bion calls dependency. When this aspiration is frustrated by reality and the inadequacy of the group leader becomes manifest, the group gathers to fight external dangers or to flee from them. However, the group does not lose hope that a new, powerful, and benevolent figure that can save it; and this hope translates into the creation of couples (pairs) within the group who can lead to the generation of a savior.

The other aspect of group dynamics is the "work group," which, according to Bion, is the aspect that keeps the group anchored to a sophisticated and rational level of behavior (Bion 1961). Bion postulated that the "basic assumptions" and the "work group" are two different aspects of the dynamics of the same group coexisting and opposing each other.

Since the discovery of quantum mechanics, similarities have been observed between the quantum description of the world and the functioning of our psyche. The correlations that appear between groups and members of a group during group-analysis sessions seem comparable in nature to the remote correlations that appear between two related quantum systems (Einstein *et al.,* 1935; Schrödinger & Bohr, 1935; Schrödinger & Dirac, 1936; Bell, 1964a, 1964b).

Similarly, to what we did in (Trojaola-Zapirain *et al.,* 2015), in this study we use the concept of entropy, which was introduced in the mid-19th century by Rudolf Clausius (2010), and reinterpreted in terms of statistical mechanics by Ludwig Boltzmann (1964) toward the end of the century. We recall here what we wrote in (Trojaola-Zapirain *et al.,* 2015) about this subject. The concept of entropy, originally a thermodynamic construct, has been adopted by other fields of study, including information theory, psychodynamics, thermo- and ecological economics, and evolution (Balian, 2004; Brooks & Whiley, 1988; Avery, 2003; Yockey, 2005). We are mainly interested in entropy as a measure of information, and implicitly, as a measure of order and disorder (Shannon & Weaver, 1949). In information theory, entropy is used to measure the amount of information in a transmitted message and is sometimes referred to as "Shannon entropy." In this context, the definition of entropy is expressed as the sum of terms, depending on a set of discrete probabilities:

$$H(X) = -\sum_{i=1}^{n} p(x_i) \log p(x_i)$$

where $p(x_i)$ is the probability that a particular message is actually transmitted. We should note here that the relationship between information and thermodynamic entropy has been, and remains, controversial (Balian, 2003; Brillouin, 1962; Georgescu-Roegen, 1971; Tribus & McIrvine, 1981; Chen, 2005; Frigg & Werndl, 2011).

In this study, the choice of one of the two pictures in our questionnaire can be described as a binary process, whose outcome can be either 1 (e.g. upper picture) or 0 (e.g. lower picture). This process is also called a Bernoulli process, in which there can be only two outcomes (1 or 0) that are mutually exclusive and exhaustive: success with a probability of p and failure with a probability of (1 – p). If X denotes a random variable, we have the following formula:

$$\Pr(X = 1) = 1 - \Pr(X = 0) = 1 - q = p.$$

with Pr being the probability of the outcome. A classical Bernoulli process is a single toss of a coin, which is defined as fair if p = 1 / 2. The Bernoulli distribution is a special case of a binomial distribution with *k = 1;* hence, we have the following formula:

$$f(k; p) = p^k(1-p)^{1-k} \text{ for } k \in \{0,1\}.$$

$$E(X) = p \text{ and } Var(X) = p(1-p)$$

In information theory, the entropy of a Bernoulli process (Bernoulli entropy, H_b) is defined as

$$H(X) = H_b(p) = -p\log(p) - (1-p)\log(1-p)$$

When p = 1 / 2, the binary entropy function attains its maximum value. This is the case of the unbiased bit, the most common unit of information entropy.

In our previous study on entropy in a group-analysis training program Trojaola-Zapirain *et al.,* 2015), we discussed the role of entropy in group dynamics. Considering that entropy links the concepts of order and information, we could think of it in psychodynamic terms as the expression of a fundamental archetype, which otherwise has been interpreted as Chaos and Cosmos, Eros and Thanatos, and so on. In the case of entropy, the two aspects are the creative order (how much order is there?) and the destructive disorder (how much disorder is there?), but also the destructive order (there is no more information to obtain) and the creative disorder (there is still information to obtain). With this in mind, we can suppose that when entropy increases in groups, both creative and destructive, this is due to the "work group." The activity of the work group increases order but reduces the amount of information that can be extracted from the group. At the same time, the disorder—both creative and destructive—decreases, and this is a sign of a reduction of the effect of the basic assumptions. The action of the basic assumptions is to increase the disorder, but also to increase the amount of information that can be extracted from the group.

A comparison of group-analysis training and aggression-management training is of interest because the group-analysis training was focused on Bion's basic assumptions, and the aggression-management training was focused on the work group. The goal of the current study was to examine the differences between the two group's evolution of picture choices and entropy by taking measures over time to detect corresponding trends in entropy.

Materials and Methods

Participants

The group at the OMIE included 31 attendees, 10 members of the training staff, and 4 members of the organizing staff. Two attendees were excluded from the study because they did not complete the training. The training consisted of 10 sessions. At the beginning of the first session and at the end of each session, the participants were asked to complete the questionnaire. Demographic data and socio-economic characteristics of the participants are presented in Table 1.

We conducted the study of the APIC group during their 13 training sessions. The participants completed the questionnaires three times at each session: before the first training day, and after the close of the second and the fourth (the final day) training days. Only attendees were tested. Our analysis consisted of 13 groups, totaling 147 participants (118 women and 29 men) when combined. The demographic and socio-economic characteristics of the participants are presented in Table 2.

The Ethics Committee of Geneva University Hospital approved the study's protocol, which adheres to the Helsinki Declaration for research with human subjects; approval was also granted by the OMIE Foundation. All participants provided written informed consent after receiving oral and written information about the experiment. All of the participants' data were coded so that they remained anonymous, including anonymity from the researchers analyzing the data.

Table 1. Demographic, Socio-Economic, and Group Characteristics of the Participants in the OMIE Group. Note: Participants' characteristics are expressed as the numbers and percentages of staff, trainees, and participants. The values reported are number of participants in each age class, median age and the interquartile ranges (Q1 and Q3 reflect the 25th and 75th percentiles, respectively), sex distribution expressed as the number and percentage of female participants, number of participants in each socio-economic subcategory, number of participants in each enrollment year, and number of participants in each of the training sub-groups. Groups A to D comprised the four "small groups," group E consisted of the leaders of the "large group," and group F consisted of the organizing staff.

	Subcategories	Staff		Trainees		All	
		(n = 14)		(n = 31)		(n = 45)	
Age (years)	20–30	1	7.1%	21	67.7%	22	48.9%
	31–40	5	35.7%	8	25.8%	13	28.9%
	41–50	4	28.6%	2	6.5%	6	13.3%
	>50	4	28.6%	0		4	8.9%
	Median (Q1–Q3)	42.5	(33–50.5)	29	(27–32.5)	31	(28–38)
Sex	Female	7	50.0%	24	77.4%	31	68.9%
Marital status	Married	4	28.6%	29	93.5%	33	73.3%
	Divorced/widowed	3	21.4%	0		3	6.7%
	Single	7	50.0%	2	6.5%	9	20.0%
Professional status	Psychologist	13	92.9%	17	54.8%	30	66.7%
	Psychiatrist	1	7.1%	4	12.9%	5	11.1%
	Social worker	0		4	12.9%	4	8.9%
	Nurse	0		3	9.7%	3	6.7%
	MD	0		2	6.5%	2	4.4%
	Public servant	0		1	3.2%	1	2.2%
Enrollment year	1	0		10	32.2%	10	22.2%
	2	0		14	45.2%	14	31.1%
	3	0		7	22.6%	7	15.6%
	4	8	57.1%	0		8	1.8%
	5	6	42.9%	0		6	13.3%
Sub-groups	A	2	14.3%	8	25.8%	10	22.2%
	B	2	14.3%	9	29.0%	11	24.4%
	C	2	14.3%	6	19.4%	8	17.8%
	D	2	14.3%	8	25.8%	10	22.2%
	E	2	14.3%	0		2	4.4%
	F	4	28.6%	0		4	8.9%

Table 2. Demographic, Socio-Economic, and Sub-Group Compositions of the Participants of the APIC Group. Note: Participants' characteristics are expressed in numbers and percentages of participants. Values reported are number of participants in each age class, median age and the interquartile ranges (Q1 and Q3 reflect the 25th and 75th percentiles, respectively), sex distribution expressed as numbers and percentages of female subjects, number of participants in each professional sub-category, and number of participants at each session.

	Subcategories	All (n = 147)	
Age (years)	20–30	38	25.9%
	31–40	51	34.7%
	41–50	34	23.1%
	>50	24	16.3%
	Median (Q1–Q3)	36	31.5–41.3
Sex	Female	118	80.3%
Marital status	Married	72	49.0%
	Divorced/widowed	20	13.6%
	Single	55	37.4%
Professional status	Psychologist	1	0.7%
	Social worker	1	0.7%
	Nurse	118	80.2%
	Ergotherapist Physiotherapist	12	8.2%
	Admin Work	15	10.2%
Session	06/10/08	11	7.5%
	12/10/08	10	6.8%
	14/10/08	9	6.1%
	04/11/08	9	6.1%
	24/11/08	11	7.5%
	21/04/09	13	8.8%
	12/05/09	11	7.5%
	02/06/09	8	5.4%
	17/11/09	13	8.8%
	18/10/10	18	12.2%
	08/11/10	8	5.4%
	01/06/10	12	8.2%
	19/04/10	14	9.5%

Questionnaire

To evaluate the extent to which participants acted in accordance with a common group unconscious, we used an "absurdum questionnaire" of 50 pairs of pictures (Trojaola-Zapirain *et al.,* 2014; 2015). For each of the 50 pairs, participants were asked to choose one of the two pictures. A typical page with hypothetical answers can be seen in Fig 1. The questionnaire had to be completed within 3 minutes and corrections were not allowed. The pictures were color or black-and-white drawings and photographs obtained from the Web. As described in our previous reports (Trojaola-Zapirain *et al.,* 2014; 2015), to minimize biases that can be introduced by a common cultural background, we designed the "absurdum questionnaire" using pictures as unrelated with each other as possible, so that answers would rely as little as possible on logical thinking or culturally acquired knowledge. This method was intended to avoid the multiplier effects that a typical word questionnaire can introduce, as the latter requires conscious reflection unique to one's own unconscious (Zanello *et al.,* 2004).

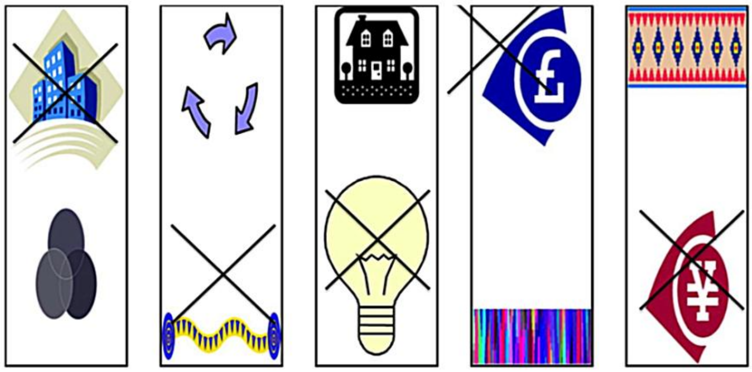

Figure 1. A Page from the "Absurdum Questionnaire" with "Fake" Answers.

The 100 images that were chosen for the questionnaire were randomized to form 50 pairs of pictures, which were presented on 10 A4-format landscape-oriented sheets with five pairs of pictures per page. Each pair occupied approximately 4 cm (horizontal) by 11.5 cm (vertical). For the 11 testing sessions of the OMIE group and the three sessions of the APIC group, the pairs were randomly ordered on the 10 sheets to avoid mnemonic or learning effects. The participants were instructed to select one picture from each of the 50 pairs in the questionnaire without any reflection and within a maximum of 3 minutes.

Procedures

The training program for group analysis consists of a 5-year program that trains group therapists to conduct group analysis. Trainees take courses on the theory, methods, and the application of group analysis, and they participate in analytical groups to gain practical experience with group dynamics. Practical training is based on 10 modules per year, with each one lasting one and a half days: Friday (12 hours) and Saturday (5 hours). Participants in different years of training were divided into groups of 8–10 people, including a group leader and an observer, who were members of the staff. During this study, there were four such groups (A to D). These groups met three times for 1.5 hours, which was the allotted time for a module. At the end of each day, the four groups gathered for 1.5 hours in a "large group," which included the "large group" leaders (group E, Table 1). Finally, group F was composed of the members of the directing committee, including the remaining staff, which met during the modules.

The APIC training is designed for people facing verbal or physical aggression in their workplace in various health-related contexts (mental health, developmental disabilities, prison, security, public services, and education). The goal of the APIC training program is to enable participants to acquire and apply an approach to assess and prevent the potential aggression of patients. This training is based on the concept of protection of oneself, the patient, and third parties. The duration of the training is 4 days, for 7.5 hours each day.

During the first test session in both training programs, participants completed the anonymous socio-demographic form, and identified themselves with a code of their choice. The same code was used to label their completed questionnaires throughout the study, and thus, preserve their anonymity.

Data analysis

In the following analysis, the most frequently selected picture of each pair during the first test is indicated as picture A (A_i, i = 1, 50), whereas the other picture is designated as B (B_i, i = 1, 50). Frequency tables were computed for each pair of pictures and each one of the sessions (Figures 2 and 3). A detailed analysis of the OMIE group was reported in previous studies by Trojaola-Zapirain *et al.*, (2014; 2015).

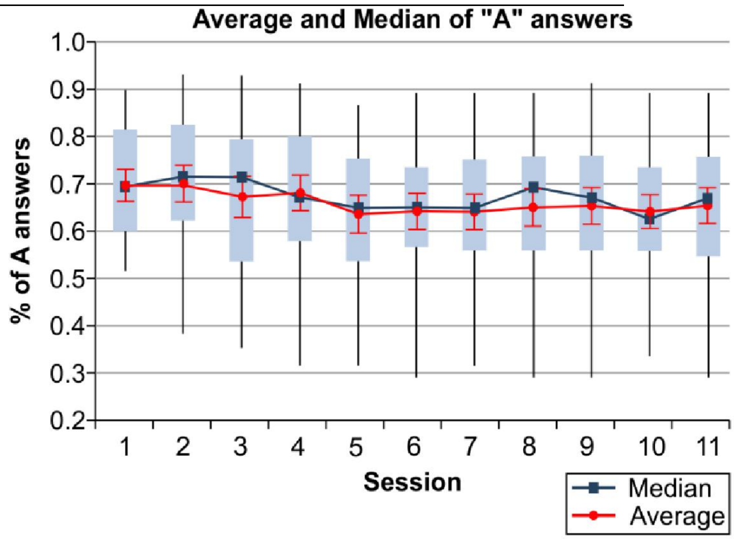

Figure 2. Evolution of the Average Proportions of the OMIE Group's Initially Most Frequently Selected Pictures (Picture A). The proportions of the participants (± 95% confidence intervals are shown for the average points, i.e., the red vertical lines) who chose the initially preferred picture (A) are averaged over the 50 questions for each of the 11 sessions (horizontal axis). The figure also shows the median (blue line) and interquartile ranges (blue boxes and black lines).

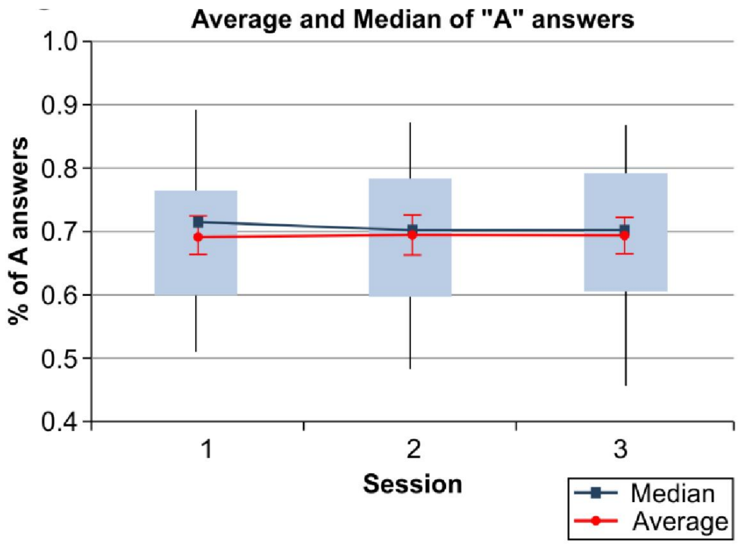

Figure 3. Evolution of the Average Proportions of the APIC Group's Initially Most Frequently Selected Pictures (Picture A). The proportions of participants (± 95% confidence intervals are shown for the average points, i.e., the red vertical lines) who chose the initially preferred pictures (A) are averaged over the 50 questions for each of the three sessions (abscissa). The figure also shows the median (blue line) and interquartile ranges (blue boxes and black lines).

Evolution of the number of answers

To further refine our analysis, we turned our attention to the number of transitions between A and B answers in each successive pair of tests. Our objective was to compare the observed number of transitions with the number of transitions observed in a random distribution. Our hypothesis was that, during each session, the number of As and Bs for each question would be distributed as a binomial distribution with the observed frequency, and therefore, that the number of transitions would be the number expected under these conditions. To verify our hypothesis, we ran a Monte Carlo simulation, in which we extracted the sequence of the 11 sessions 1,000,000 times using a binomial distribution with the observed averages of As and Bs for each question at each session. We then counted the resulting transitions between As and Bs and Bs and As. Next, we constructed the integral probability distribution of the total number of transitions for each session and compared the observed number of transitions with the calculated probability distribution (two-tailed).

Bernoulli entropy

We calculated Bernoulli entropy as the sum of the entropy of the Bernoulli trials, i.e., the answers to the 50 questions for each of the sessions:

$$H_j = \sum_{i=1}^{50} -p_{ij}\log(p_{ij}) - (1-p_{ij})\log(1-p_{ij})$$

where p_{ij} is the observed probability (frequency) of answer A for the ith question (i [1, 50]) at the jth session (j [1, 11] for the OMIE group and j [1, 3] for the APIC group). We compared trends between the OMIE group (over 11 sessions) and the APIC group (over three sessions) in the number of answers and Bernoulli entropy.

Results

In the overall dataset of the OMIE group, we found 2,143 missing data points out of 24,750 (8.7%), which were imputed as follows:

- For the first session, the missing response was replaced by the picture that was in the same location (top or bottom) of the one chosen in the preceding answer (7 occurrences out of 2,250; 0.3%).
- For the missing responses in the following sessions (2–11), the participant's answer to the same question in the preceding session was used instead (last observation carried forward approach [LOCF], which occurred 2,136 times out of 22,500; 9.5%).

The staff (14 members) did not complete the questionnaire for the second session, which alone accounts for 700 missing data points (i.e., 50 × 14, or 2.8%). In the APIC training group, 318 of the 22,050 (1.4%) missing data points were completed via a similar LOCF procedure:

- For the first question of the first session, if the response was missing, it was taken from the previous participant (1 occurrence out of 147; 0.7%).
- For the first session, the missing response (other than for the first one) was replaced by the picture that was in the same location (top or bottom) of the one chosen in the preceding answer (147 occurrences out of 7,203; 2.1%).
- For the missing responses in the second or third session, we took the answer of the participant to the same question in the previous session (62 occurrences out of 7,350 (0.8%) for the second session and 108 occurrences out of 7,350; 1.5%) for the third session).

Evolution of the number of decisions

Using the conventional practice of estimating the probability of obtaining a number of transitions equal to or lower than the ones observed, we calculated the integral of the probability density from zero to the observed number of transitions. In all cases, however, this integral was zero, as we observed no element of the generated samples with a number of transitions equal to or lower than the observed ones during our Monte Carlo simulation. Consequently, in all cases, p was equal to zero. In order to estimate the errors of these results, we changed the integral histograms into variable bin width histograms, so that all bins contained non-zero density estimates (Lugosi & Noble, 1996; Noble, 1996). This means that we merged all bins from zero to the bin corresponding to the first number of transitions that occurred at least once in our Monte Carlo simulation. In all cases, the corresponding bin contained one single event, and therefore, the probability for all sessions was $p < 10^{-6} \pm 10^{-6}$, considering a standard Poissonian error for the observed transitions in each bin (Figures 4–7).

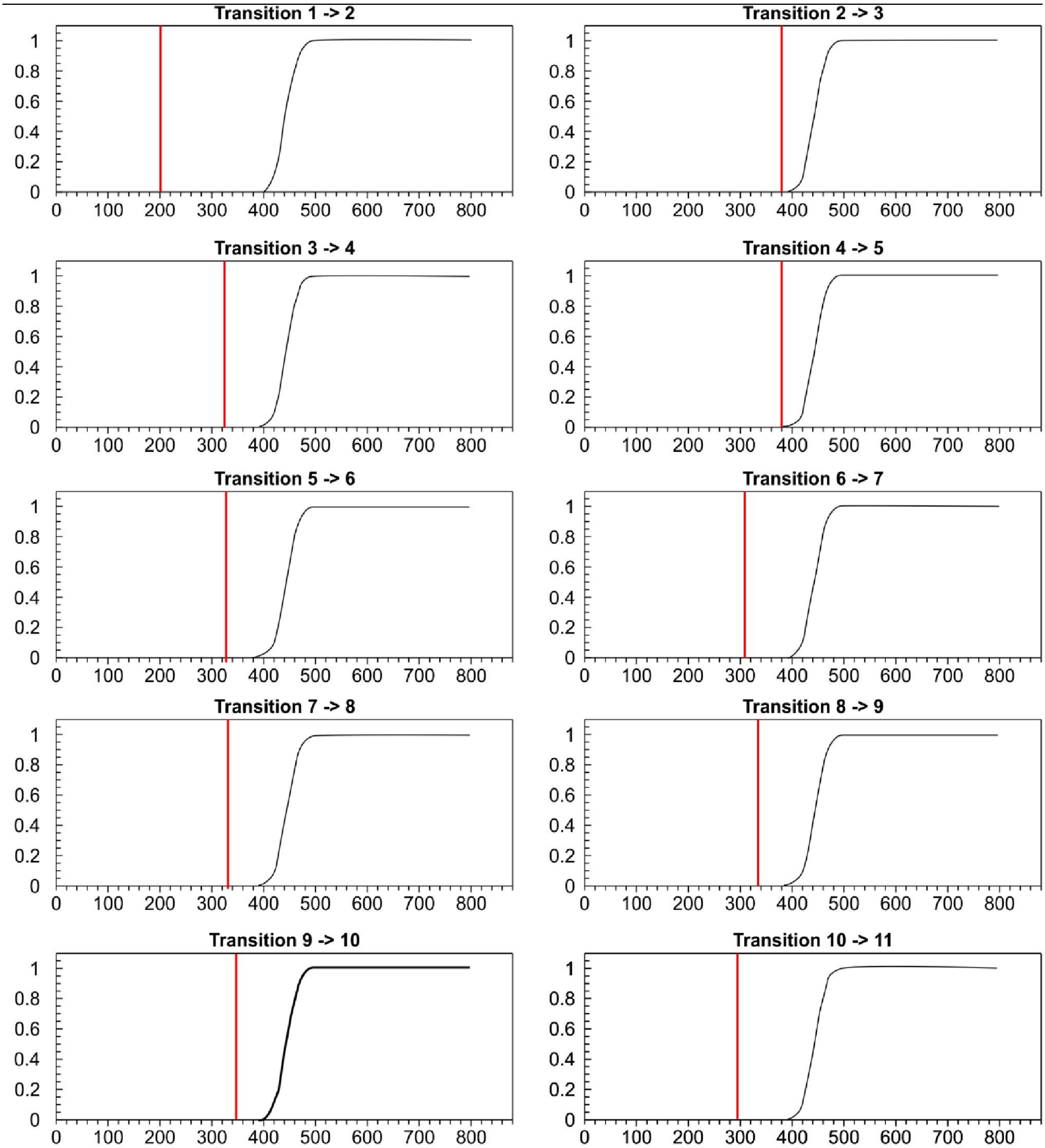

Figure 4. Probability Distributions of the Number of Transitions A→B between the 11 Sessions (OMIE Group). The curves are the integral probability distributions calculated via Monte Carlo simulations, and the vertical bars are the values that were actually observed. The number of observed transitions was significantly smaller than the expected one for all sessions.

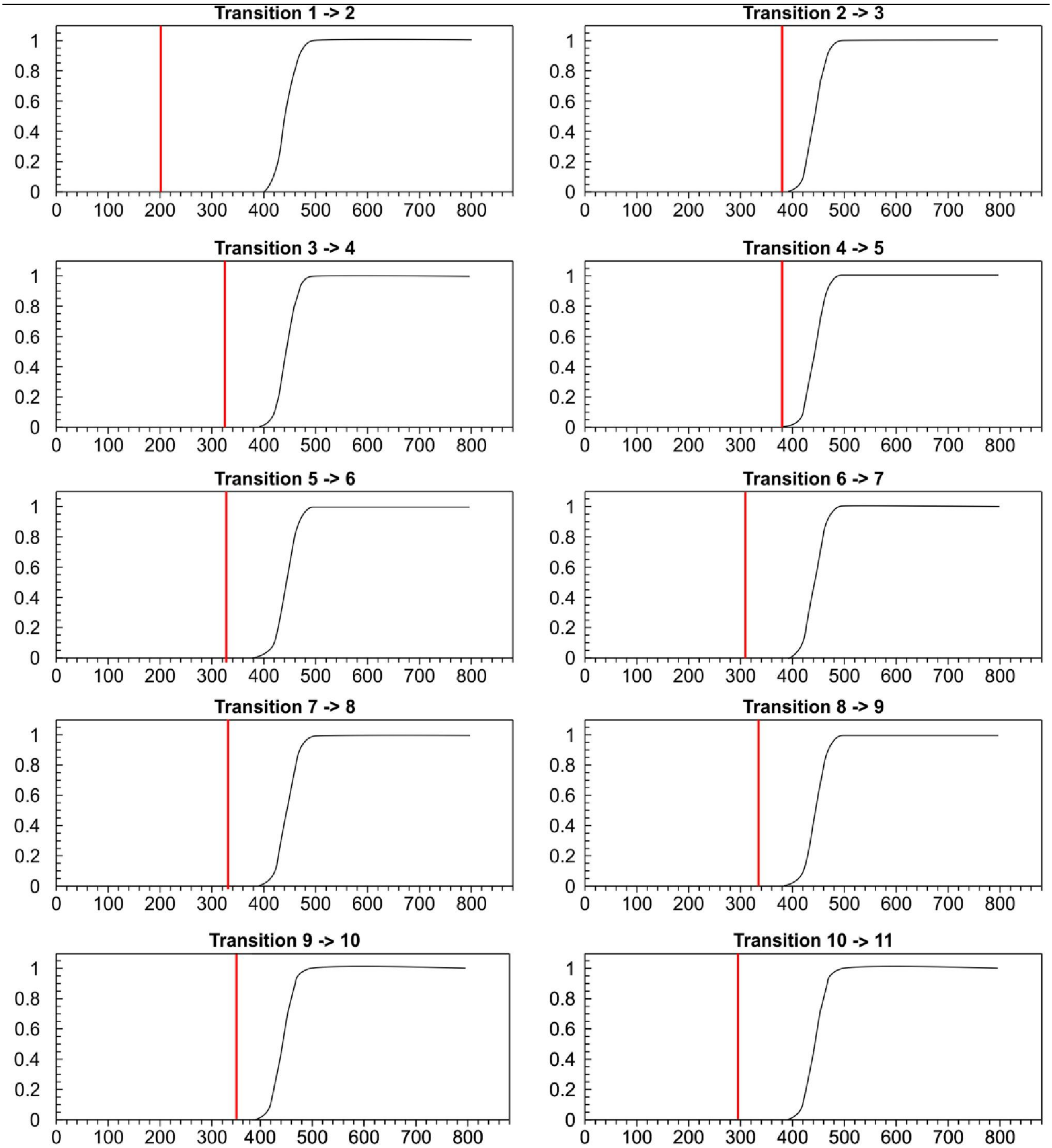

Figure 5. Probability Distributions of the Number of Transitions B→A between the 11 Sessions (OMIE Group). The curves are the integral probability distributions calculated via Monte Carlo simulations, and the vertical bars are the values that were actually observed. The number of observed transitions was significantly smaller than expected for all sessions.

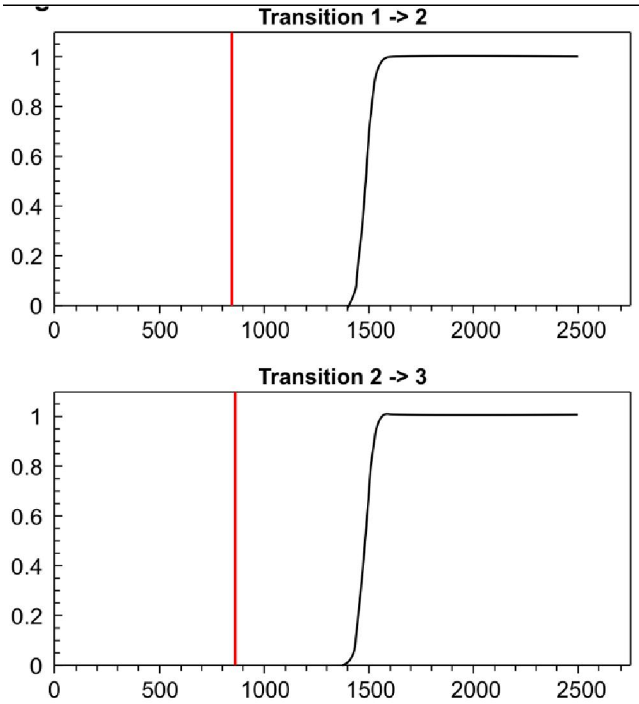

Figure 6. Probability Distributions of the Number of Transitions A→B between the Three Sessions (APIC Group). The curves are the integral probability distributions calculated via Monte Carlo simulations, and the vertical bars are the values that were actually observed. The number of observed transitions was significantly smaller than expected for all sessions.

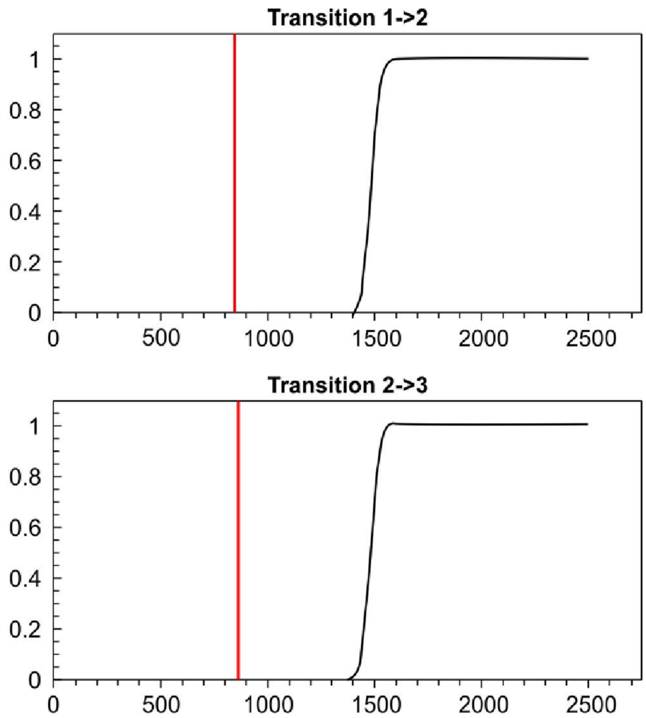

Figure 7. Probability Distributions of the Number of Transitions B→A between the Three Sessions (APIC Group). The curves are the integral probability distributions calculated via Monte Carlo simulations, and the vertical bars are the values that were actually observed. The number of observed transitions was significantly smaller than expected for all sessions.

Entropy of the choices

The entropy in the OMIE group showed an increase from the beginning to the end of the sessions, as would be expected in a closed system, with a slight decrease at the second test administration (first week of training), and at the ninth test administration (eighth week of training; see Fig. 8).

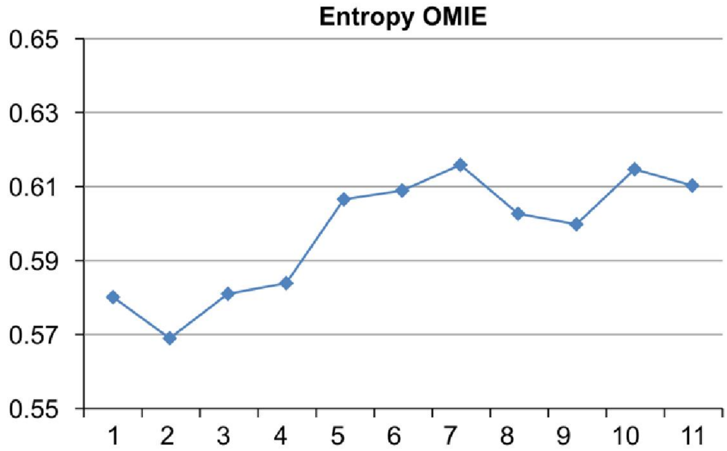

Figure 8. Bernoulli Entropy Evolution for the 11 Sessions of the OMIE Group Training.

In the APIC training (Fig. 9), the entropy decreased from the first to the second session, and remained stable from the second to the third session.

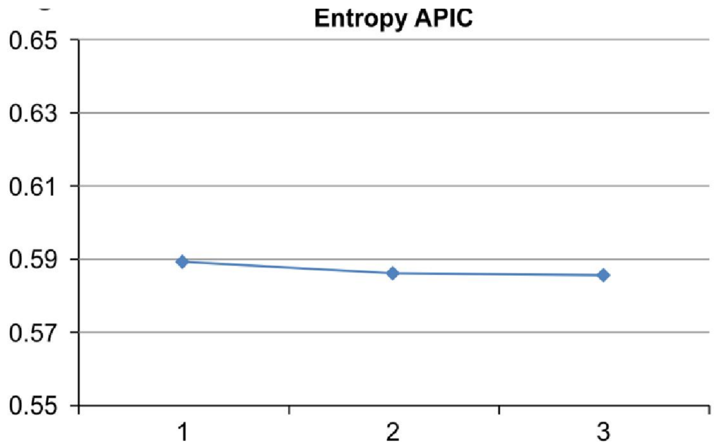

Figure 9. Bernoulli Entropy Evolution for the Three Sessions of the APIC Training.

Discussion

As we reported in a previous study (Trojaola-Zapirain *et al.,* 2014), the initial answers to the test in the case of OMIE do not reflect a 50–50 random choice between the two pictures of each pair, despite the fact that the pairs of pictures were chosen with the intention to avoid inducing social or cultural biases (Trojaola-Zapirain *et al.,* 2014; 2015). Likewise, for the APIC training, the choices were not 50–50. This initial bias could be, at least in part, a reflection of either a genuine group effect or a shortcoming of our protocol. According to Bion (1961), group effects can be seen as soon as people actually come together. They do not even need to interact actively; the mere assembly of individuals should be enough to form unconscious connections and provoke group phenomena.

Evolution of the number of choices

The number of transitions between the A and B choices, both in the OMIE and APIC training groups, were consistently lower than were those found in a situation where the choices would be random. This indicates a strong preference for choices at the individual rather than at the group level.

The fluctuations in choices between the two pictures of each pair were, therefore, significantly lower, both in the OMIE and APIC groups, than what would be expected with a pure random process. The observed number of transitions from option "A," the initial favorite, to option "B," which was chosen less often, was significantly lower than the one obtained with our biased binomial Monte Carlo simulation, and the same was true for the observed number of transitions from "B" to "A."

Evolution of entropy of choices

In the OMIE training group, we observed two decreases in the entropy of choices at the third and ninth test administrations, i.e., during the second and eighth weekends of training. If we refer to Bion's (Bion 1961) description of the evolution of a group in four phases, these two decreases correspond respectively to the phases of group idealization: the confident dependence on the leader, called "the honeymoon," and the "fight-flight" attitude, or reaction against dependence on the leader. This is followed by the group's disillusion, leading to the mourning of the loss of the ideal group.

Globally, entropy increased slightly in the OMIE group, while the entropy of the APIC group was quite stable. Keeping in mind that order and disorder are not positive versus negative concepts, we recognize two faces to entropy. On one hand, we have creative order (how much order there is) and destructive disorder (how much disorder there is). On the other hand, we have destructive order (there is no more information to obtain) and creative disorder (there is still information to gather). Because we measured Bernoulli entropy, we considered it only in terms of how much order there is, and we neglected (because of the nature of the measure) the loss of potential information (e.g., produced by the work group). At the same time, we considered disorder in terms of only how much disorder there is, neglecting creative disorder (e.g., the information content produced by the action of the basic assumptions).

In the OMIE training group, the entropy seemed to depart from a monotonic increase, only during the second part of the training, during which time the appearance of the participants' "fight-flight" attitude emerged (reaction against dependence on the leader). The goal of this training program was to work on the dynamics of the individuals and on the group's unconscious without a "practical objective." Therefore, the motivation for the group-analysis training can be characterized as "more the path than the destination of the journey." In the OMIE training program, the basic assumptions were central to all of the sessions. In contrast, the participants in the APIC program had to acquire a level of knowledge of a specific subject area. Consequently, it appears that the work group was crucial to the improvement of order—that is, reducing the Bernoulli entropy.

Entropy for the OMIE training group, where the basic assumptions competed with the work group throughout the training, eventually increased, indicating the behavior that is typical of a closed system. In the APIC training group, the work group prevailed over the basic assumptions from the very beginning of the training program, as there was a clear objective to acquire new knowledge about the management of aggression in the hospital. Thus, the APIC work group created an order that was an effective example of Bernoulli entropy from the beginning of the training. We realize that, in this study, we have provided a partial interpretation of group entropy, which prioritizes the activity of the work group, to increase the order and reduce the chaotic effects of the basic assumptions on the group's process.

Conclusions

The present study was conducted during a training program for group therapists on group analysis at the Basque Foundation for the Investigation of Mental Health (OMIE) at Bilbao and a program for caregivers exposed to aggression in a hospital with psychiatric patients (APIC) in Geneva. The study's objective was to examine the influence of group dynamics on individual group members' choices of images presented in a questionnaire that was developed to minimize cognitive and social bias. To accomplish this aim, we compared two groups of participants in two different types of training groups on measures of the evolution of the number of transitions they made from one answer to the other for pairs of pictures, as well as the entropy of their answers. One conclusion is the same as the one that we presented in previous studies: either the group is borne at the very early beginning and this has an immediate effect on members' picture choices, or there are persistent socio-cultural orientations that exist prior to the group's creation. Unfortunately, our data do not enable us to clarify this point.

If we interpret the increase of entropy as an indicator of the analytic process by which information is extracted from the unconscious and made explicit, the observed evolution of entropy indicates that the work group progressively, but not monotonically, supersedes the action of the basic assumptions. As information is extracted from the unconscious, order is brought into the group, while creativity and disorder are reduced. In the OMIE training group, the basic assumptions were present throughout the training and the work group was marginal because of the training's objective, which was to prepare group therapists. In contrast, the work group was predominant in the APIC training group because of the need to impose structure and to gain new knowledge. This again is in accordance with Bion's view of group dynamics that the action of the work group tends to prevail eventually. Due to the early orientation of the group unconscious that we have postulated, it would be important in future studies to present participants with an "absurdum questionnaire" before any interactions in the group context take place.

A future version of such a protocol will require participants to complete the questionnaire before they actually meet in the first session. In practice, this is not easy, since in the case of OMIE, the candidate is not yet admitted to the training when they meet with the training staff for their first evaluation interview. On the other hand, sending a questionnaire to participants after their selection would put the study at risk, as copies of the test could be made with possible memorization of the pairs of images. To ask for additional meetings for research purposes is demanding on the organization and can be expensive. In light of the above, we are planning a new study with the same protocol as the one of the OMIE group training, again with 11 tests, but in a university course environment.

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