

# Erratum to “Slow Open Dialectical Behavior Group Therapy for Adolescents and Parents: Longitudinal Study of Unconscious Orientation” [Psychology 12 (2021) 756-784]

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## Abstract

The original online version of this article (Fernandez-Rivas, A., Sesma-Pardo, E., Kerexeta, I., Diaz-Cosgaya, A., Vivanco, E., Carminati, F., Torres, M., Fouassier, C., Martin, F., Demongeot, J. and Carminati, G. (2021) Slow Open Dialectical Behavior Group Therapy for Adolescents and Parents: Longitudinal Study of Unconscious Orientation. *Psychology*, 12, 756-784. doi: <https://doi.org/10.4236/psych.2021.125047>) was published in Vol.12 No.5, May 2021. The author wishes to correct the errors to the following content.

## Keywords

Erratum

## 1. Introduction

This work continues our investigation in the possibility of quantifying or, at the least, objectifying group dynamics (Fernandez-Rivas et al., 2020; Trojaola-Zapirain et al., 2014, 2015, 2016, 2019). We have already described the basic principles that have led us to initiate this work in the referenced works, and therefore we

will give here only a short reminder. The study's objective is to explore the existence and the evolution of common behavior of the participants to four slow open groups taking part in a Dialectical Behavior Therapy (DBT) skills training. Two groups were composed of adolescents and two of their respective parents. We analyzed their evolution via the answers to the "absurd" questionnaire.

Dialectical Behavioral Therapy (DBT) (Linehan, 1993, 2015; Miller et al., 2017) has demonstrated an effective transdiagnostic treatment for adolescents whose main symptoms are emotional dysregulation and impulsivity. A complete program based on this therapy has been implemented in the Psychiatric Service of Basurto University Hospital (Bilbao, Spain). This therapeutic system involves several modules, including DBT skills groups for adolescents and parents.

According to Bion, there are universal principles—that he calls "basic assumptions"—guiding the group's behavior and its members in continual interaction with the external and internal realities of the group itself (Bion, 1961; Foulkes, 1964; Vergopoulos, 1983). This theory has led some psychoanalysts to suppose a "group" nature of the individual psyche (Kaës, 2010).

Bion also formulated the hypothesis of the existence of a group psychical apparatus. This hypothesis means that when the "basic assumptions" govern the group's behavior, we cannot consider the group members as separated entities but rather as the expression of a single psychical entity (Bion, 1961). It is intriguing to observe that this occurs for interacting quantum objects forming an entangled state (Aspect et al., 1982; Bell, 1964, 1966; Bohr, 1935; Einstein et al., 1935; Richens et al., 2017; Schrödinger, 1935, 1936).

Although never really interested in the study of the "collective", from which, according to him, the individual has to emerge via the process of individuation, Carl Gustav Jung has nevertheless provided one of the most potent metaphors for the "collective soul". According to him (Jung & McGuire, 1925), the individual psyche lies upon a stratified unconscious in which each successive layer belongs to a broader community of people and even, for the most profound strata, living beings. This "collective unconscious" (Jung, 1959) is the "locus" of the connections between the world of reality and the world of the soul. These connections appear "acausal" but, according to Jung (Jung, 1952, 1960), respond to the unfathomable logic of the unknowable collective unconscious.

The emergence of these connections into the sensible world gives rise to what Jung termed "synchronicity" (Jung, 1952), the meaningful correlation between an inner condition—feeling or thought—and an external event with no apparent causal connection.

When Jung met W. Pauli, one of the most profound and prolific physicists of the 20<sup>th</sup> century, the concept of synchronicity was connected to the newly discovered phenomenon of quantum entanglement that will become a fundamental—albeit controversial—cornerstone of the new physics of quantum phenomena. This gave rise to a life-long intellectual collaboration between Jung and Pauli in pursuit of the dream to root both the description of the material world

and that of the soul in the same basic principles (Jung et al., 2001).

Humbly following in their footsteps, we have described the interaction between the unconscious in terms of quantum entanglement. This description supposes the existence of a universal quantum field of (un)consciousness (Baaquie & Martin, 2005; Orlov, 1982) relating to all living creatures. Therefore, two interacting individuals would temporarily lose their individuality and form a connected system during their interaction. (Galli Carminati et al., 2017; Galli Carminati & Martin, 2008; Martin et al., 2009, 2010, 2013). It is natural to extend such a model to a group of individuals (Grinberg-Zylberbaum et al., 1994; Martin & Galli Carminati, 2009), where the entanglement between the different unconscious can bring to the formation of a single entity with a distinct behavior, explaining the correlations observed between group members (Marshall, 1989). These developments are part of a larger discipline known as psychophysics (Beck & Eccles, 1992; Conte et al., 2003; Freeman & Vitiello, 2016; Hameroff & Penrose, 1996; Penrose & Gardner, 1989; Penrose, 1994; Pitkänen, 1998, 2012; Sabbadini & Vitiello, 2019; Vitiello, 2003; Zurek, 1981).

In a recent series of works (Galli Carminati & Carminati, 2006; Galli Carminati & Martin, 2008; Martin, Carminati, & Galli Carminati, 2009; Martin, Carminati, & Galli Carminati, 2010; Martin, Carminati, & Galli Carminati, 2013), some of the authors of the present paper have focused on the possibility to describe the group psyche with concepts and models borrowed from Quantum Mechanics.

Some of the authors of the present work have formulated the hypothesis that, following the basic tenets of psychophysics, also the group psyche could be described by a multi-body entangled system (Galli Carminati & Martin, 2008; Martin et al., 2009, 2010, 2013; Martin & Galli Carminati, 2009). Moreover, this hypothesis has led to the formulation of the “absurd experiment” that is the subject of this paper, which has already been performed on different psychodynamics groups (Fernandez-Rivas et al., 2020; Trojaola-Zapirain et al., 2014, 2015, 2016, 2019).

Although the concept of entanglement of the unconscious is not new (Atmanspacher et al., 2002; Atmanspacher & Fach, 2013; Fach, 2011; Khrennikov, 2015; Walach & Römer, 2011), we failed to find in the literature an experiment similar to the one presented in this paper, which seems to be therefore entirely original.

The rationale of conducting this experiment is to try to quantify, or at least objectify, one aspect of the unconscious, measuring its effect on the participants' behavior in this study. The authors have made the hypothesis that the group environment could “amplify” a “microscopic” entanglement between the unconscious to render it detectable at the macroscopic level. The present experiment is similar to the previous ones conducted by the same authors on training groups (Trojaola-Zapirain et al., 2014, 2015, 2016, 2019) and DBT closed groups (Fernandez-Rivas et al., 2020). In this latter study, we have introduced a “questionnaire zero” to evaluate the socio-cultural bias in the choices before the groups

meet. The novelty of the present study is that it uses the same experimental setup on two “slow open” groups of adolescents and their parents who were following a Dialectical Behavior Therapy (DBT) skills training at the Psychiatric Service of Basurto University Hospital in Bilbao, Spain.

This setup is different from the ones considered before since we cannot any longer consider a “closed” system, but rather two couples of systems interacting with each other and, necessarily, open to the environmental and existential situations and influences of the larger social group.

The perspective of this study is to observe the evolution of the answers to the questionnaire, considering whether the group dynamics is also tributary of the larger social group interacting as the environment in quantum mechanics.

## 2. Materials and Methods

### 2.1. Participants

We have included in this study four different groups of participants: two composed of adolescents participating in Dialectical Behavior Therapy (DBT) skills training and two others consisting of their respective parents, also participating in DBT skills training. The demography of the groups is presented in **Table 1**.

The adolescents followed two slow-open DBT skills training groups of 2-hour sessions every week. One of the participants was excluded from the study because she did not participate in any group sessions. The group of parents was a slow open group of 10 DBT sessions of 1.5 hours each, also weekly.

The study started after the Basurto University Hospital Ethics Committee (Bilbao, Spain) gave its approval in adherence to the Helsinki Declaration for research with human subjects. All participants gave written informed consent after receiving oral and written information about the experiment, and specifically for adolescents, both the participant and their parents or legal tutor signed

**Table 1.** Demographic, social, and group composition of the participant sample with the age of participants in each group, adolescent and member of their family.

	Adolescent G1	Adolescent G2	Parents G1	Parents G2
Total	21	16	25	19
Female	14 (66.7%)	14 (87.5%)	18 (72%)	11 (57.9%)
Average age	15.6	16.4		
1Q-3Q	14.9 - 16.5	15.3 - 17.4		
Biological Family	8	7		
Adoptive Family	1	2		
Single Parent	10	6		
Other living situations	2	1		
Undergrad education	17	9		
Graduate education	4	6		
Postgraduate education		1		

informed consents. All participant data were coded to be completely anonymous, including for the researchers analyzing the data.

## 2.2. Procedure

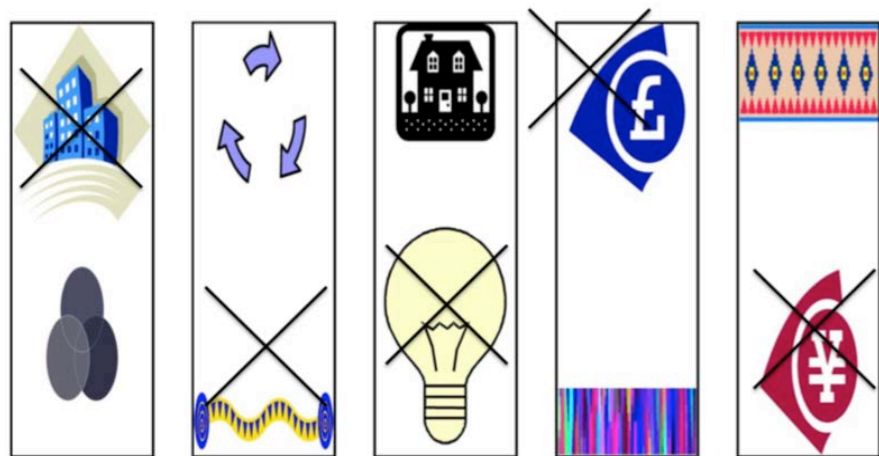
The skills taught in these groups are mindfulness, distress tolerance, regulation of emotions, interpersonal effectiveness, and walking the middle path. The group for adolescents consists of 16 2-hour sessions weekly. And the group for parents consists of 10 sessions of 1.5 hours duration, also weekly.

The groups included in this study were “slow-open,” which means that participants could enter and leave the group during the training. Two therapists ran each group.

Before joining the group, all participants (adolescents and parents) attended an interview for evaluation and information on the group’s methodology and the research. During that interview, participants filled the informed consent and the questionnaire number “zero” (with one exception). In addition, sociodemographic data on adolescents were collected (see [Table 1](#)).

An identification code was assigned to each participant to keep his identity anonymous for the research. We have extensively described the general setting of this experiment in previous publications ([Fernandez-Rivas et al., 2020](#); [Trojaola-Zapirain et al., 2014, 2015, 2016, 2019](#)). It will be enough to recall that we have used a questionnaire composed of 50 pairs of figures for this work. Participants were asked to select one picture from each pair and to complete the questionnaire in three minutes. The pictures’ choice aims to minimize the socio-cultural bias introduced by a word questionnaire ([Zanello et al., 2004](#)). The figures in each pair were always the same, but the pairs were randomly reshuffled at each test repetition to minimize mnemonic effects. [Figure 1](#) reports a sample page from the questionnaire with fictional picture choices.

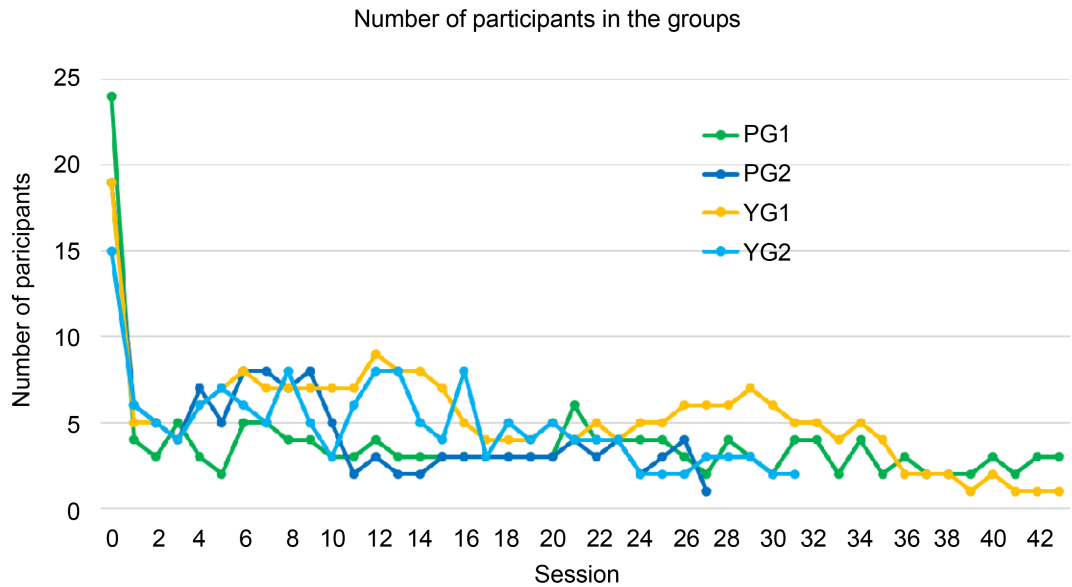
We will name the four groups PG1 (first parent group), PG2 (second parent group), YG1 (first adolescent group), and YG2 (second adolescent group). Not all the parents participated in the groups. The duration of the four training



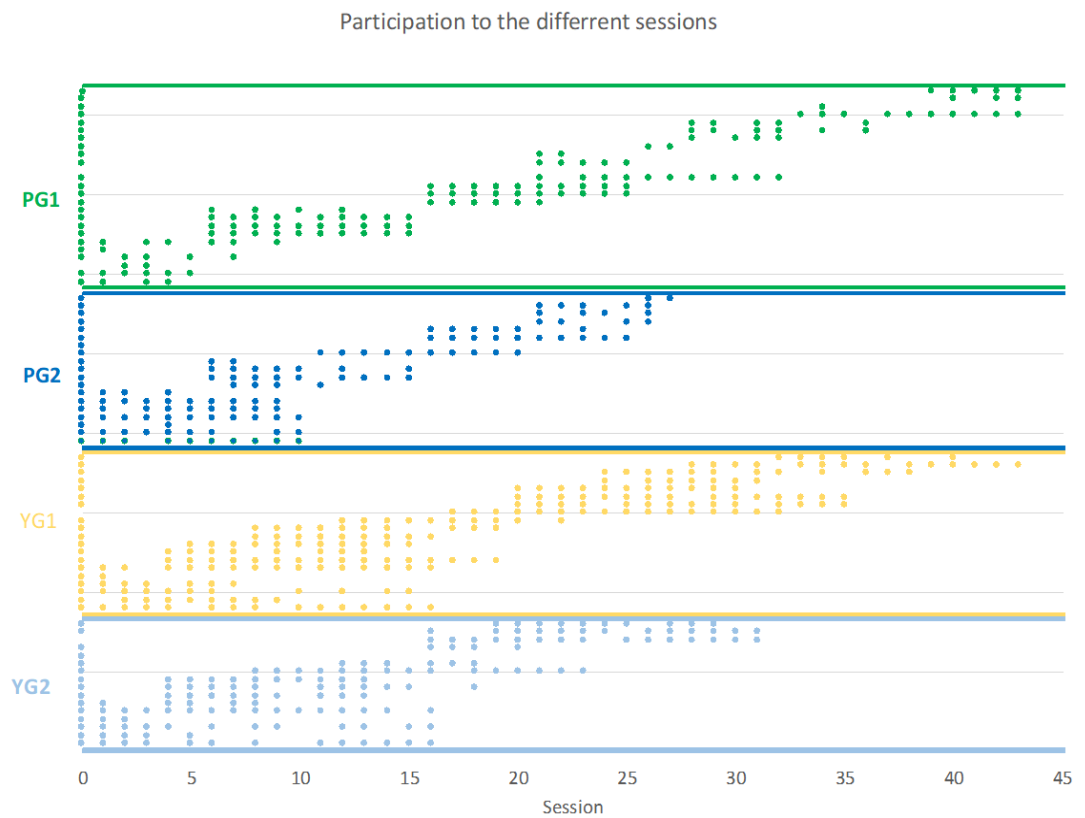
**Figure 1.** A page from the questionnaire with “fake” answers.

courses is, respectively, 43, 31, 43, and 27 sessions.

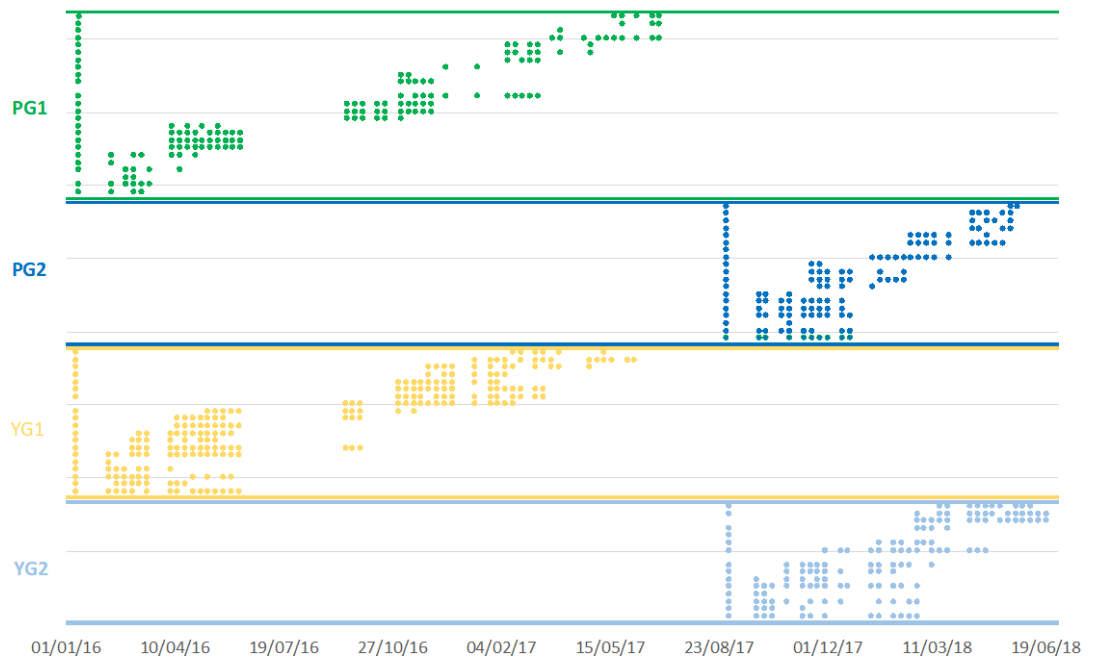
The participation has been somewhat uneven to the different groups (see **Figures 2-4**). The presence in the group of adolescents was less regular after the 5<sup>th</sup> session.



**Figure 2.** Number of participants in the different sessions.



**Figure 3.** Participation of the trainees at the different sessions.



**Figure 4.** Evolution of the attendance to the training versus time.

### 2.3. Data Analysis

The most frequently chosen picture in each pair during the “zero” test (the questionnaire administered before the first meeting) is indicated as picture A ( $A_i$ ,  $i = 1.50$ ), while the other picture is designed as B ( $B_i$ ,  $i = 1.50$ ). We have computed frequency tables for each pair of images and each session for the four groups. Because the present work is focused on the influence of the group unconscious on the measured effects—i.e., the answers to the questionnaire—we consider only the proportion of the participants choosing picture A or B for each of the 50 questions, irrespectively of how the individual participant’s choice evolved.

Given the very uneven participation, we decided not to correct for data that were completely missing. Some of the sheets were incorrectly marked, and those we corrected with an LOCF (Last Observation Carry Forward, (Hamer & Simpson, 2009)) algorithm, using the same answer from the previous session. If this was not possible, the session before was used, and so on. There was no instance of invalid questionnaires for both the zero and first sessions. The total number of corrections is reported in **Table 2**.

## 3. Results

### 3.1. Evolution of the Most Chosen Picture

We report the evolution of the A’s (most chosen picture in questionnaire zero) for the four groups during the training. We have compared the percentage of the “A” picture choice for the 50 questions in the successive sessions. For this, we have performed a Friedmann test on the whole set of the <number of sessions>  $\times$  50 data, and then, if significant—which has always been the case—we have performed a post-hoc Conover test (Conover, 1999; Conover & Iman, 1979) between



**Table 2.** Corrections to the data with LOCF.

Group	Total valid answers	Answers corrected with LOCF	%
PG1	8148	101	1.2%
PG2	6406	95	1.5%
YG1	11,131	69	0.6%
YG2	7037	63	0.9

successive sessions. All the data analysis has been done with the R software (R Core Team, 2020).

We show the statistically significant difference in the choice of A's between sessions, including the initial questionnaire (see **Figure 5** and **Table 3**).

### 3.2. Evolution of the Transitions between Questionnaires

We consider now how the choice of A and B has evolved comparing the changes of choice of the participants. For each couple of successive sessions, we count the number of participants whose choice has changed from A to B and the number of those whose choice has changed from B to A. We indicate this *transition* with the number of the second session, i.e., we indicate with  $n$  the transition (A→B or B→A) between session  $n-1$  and session  $n$ . To avoid repetitions, we will refer to this explanation as the notation explained in the section “Evolution of the transition between questionnaires.”

We first consider the number of changes from A→B. The statistical differences we found for the four groups are reported in **Table 4** and **Figure 6**.

Now we consider the same statistics but for the transitions B→A for the four groups. The results are shown in **Figure 7** and **Table 5**.

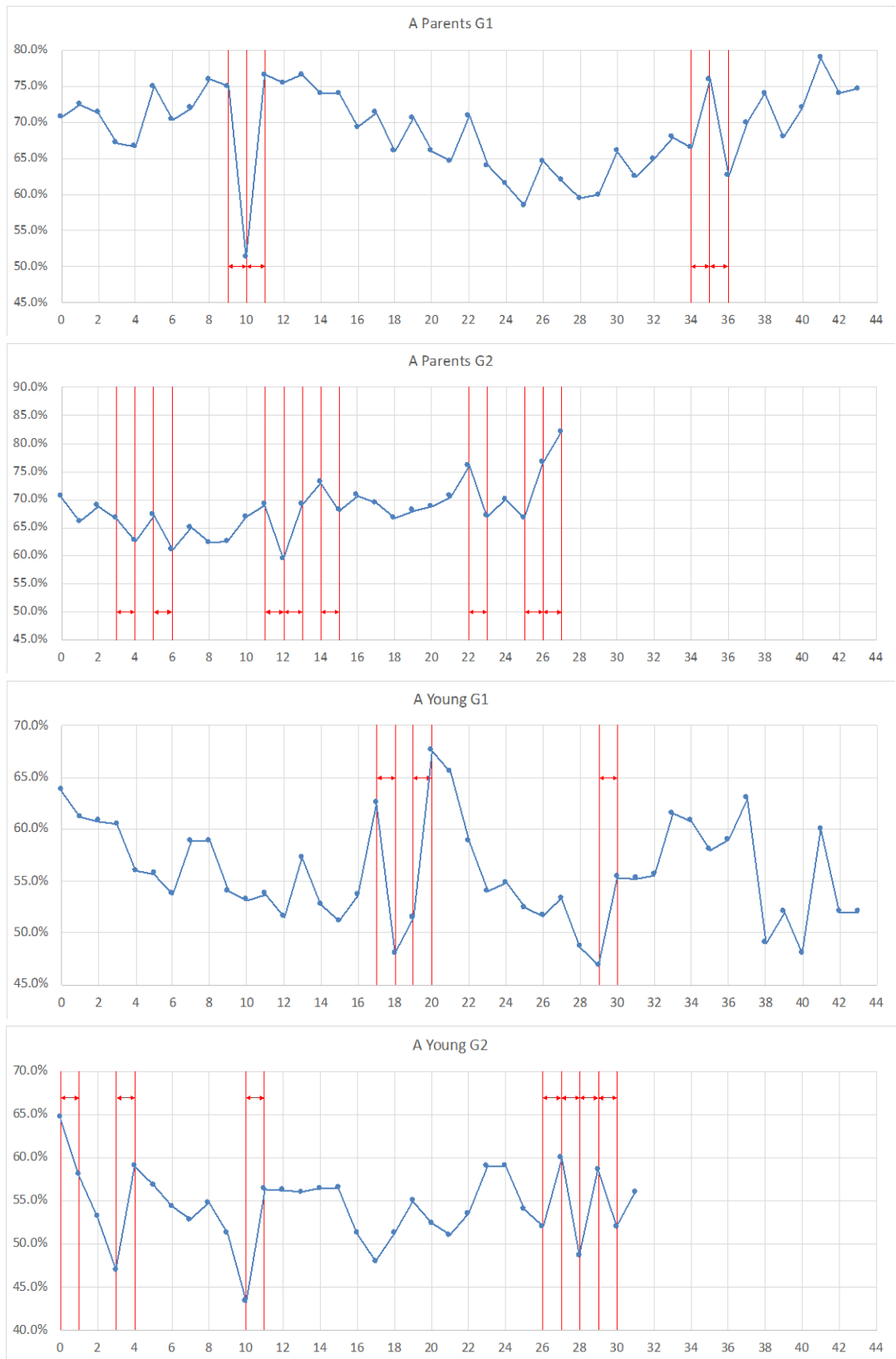
We now investigate whether the individual changes of choice A→B and B→A are simple statistical fluctuations in people's preference or whether there is a statistically significant difference. This may indicate that the change of choice of the group taken as an ensemble is not casual and that there is a significant movement either toward the initial choice or away from it. As before, we indicate with  $n$  the change from A→B or B→A between session  $n-1$  and session  $n$ . We will call this the non-casuality plot.

We found statistically significant differences, considering the four groups, with the notation explained in the session “Evolution of the transitions between questionnaires,” as shown in **Figure 8** and **Table 6**.

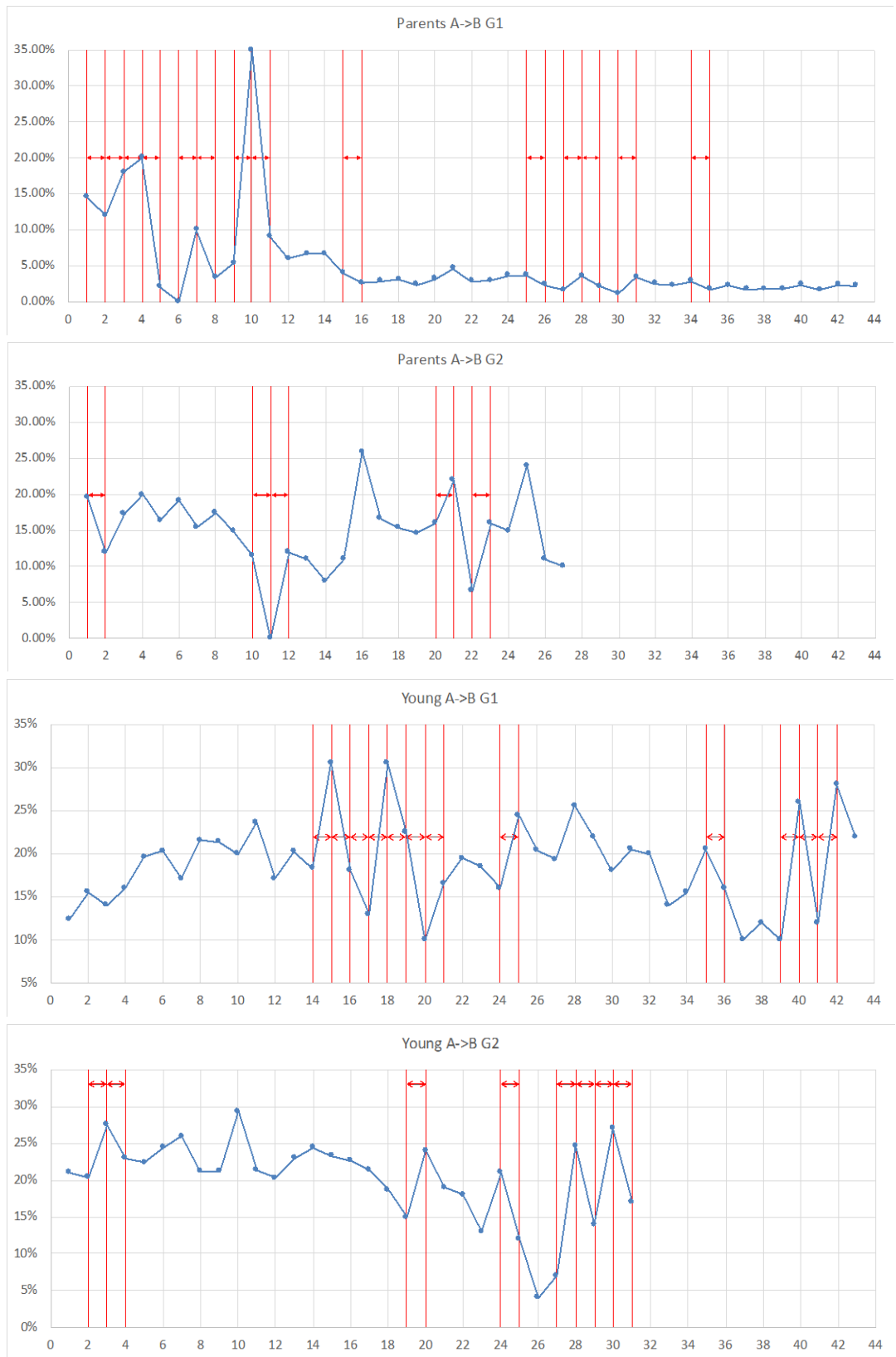
### 3.3. Evolution of “Flux” and “Focus”

We can combine the transitions A→B and B→A into two derived quantities that help to interpret the evolution of the groups' choice of pictures. We call the quantity A→B+B→A the “flux” as it expresses the total “activity” of the group in changing the initial choice of picture. We introduce a second quantity, B→A-A→B, that we call “focus” as it indicates the tendency to confirm, if greater than 0, or move away from, if smaller than 0, the initial choice of A.





**Figure 5.** Evolution of the choice of A for the four groups during the training versus the session number. The arrows mark the couple of sessions for which there is a statistically significant difference ( $p < 0.05$ ) with the Conover post-hoc test.



**Figure 6.** Evolution of the change in choice A→B for the four groups during the training versus the session number. The arrows mark the couple of sessions for which there is a statistically significant difference ( $p < 0.05$ ) with the Conover post-hoc test.



**Figure 7.** Evolution of the change in choice B->A for the four groups during the training versus the session number. The arrows mark the couple of sessions for which there is a statistically significant difference ( $p < 0.05$ ) with the Conover post-hoc test.



**Figure 8.** Comparison of the percentage of A->B and B->A changes for each group as calculated with the Conover test following a Friedman test on the totality of the percentages. We report on the graphs the average of the percentages of changes of each type for each session. A red arrow indicates the transitions for which there is a significant difference ( $p < 0.05$ ) between the A->B and B->A percentages for the 50 questions. For clarity, we report the *negative* of the average of the A->B percentages.

**Table 3.** Comparison of the choices of the “A picture” between successive sessions with the Conover post-hoc test. Two sessions are statistically different when  $p < 0.05$ , and the corresponding cell is red in the table.

Comparison	PG1	PG2	YG1	YG2	Comparison	PG1	PG2	YG1	YG2
A00 - A01	0.54	0.37	0.43	0.02	A22 - A23	0.12	0.03	0.25	0.09
A01 - A02	0.81	0.26	0.53	0.15	A23 - A24	0.59	0.70	0.97	0.87
A02 - A03	0.51	0.75	0.98	0.06	A24 - A25	0.53	0.20	0.55	0.31
A03 - A04	0.73	0.04	0.35	0.00	A25 - A26	0.17	0.00	0.93	0.44
A04 - A05	0.05	0.10	0.91	0.98	A26 - A27	0.85	0.03	0.68	0.02
A05 - A06	0.23	0.05	0.61	0.13	A27 - A28	0.20		0.36	0.01
A06 - A07	0.47	0.37	0.22	0.89	A28 - A29	0.53		0.49	0.02
A07 - A08	0.47	0.57	0.93	0.57	A29 - A30	0.18		0.05	0.04
A08 - A09	0.74	0.90	0.18	0.25	A30 - A31	0.33		0.69	0.38
A09 - A10	0.00	0.15	0.90	0.08	A31 - A32	0.69		0.78	
A10 - A11	0.00	0.17	0.67	0.00	A32 - A33	0.32		0.39	
A11 - A12	1.00	0.00	0.45	0.88	A33 - A34	0.60		0.99	
A12 - A13	0.81	0.00	0.19	1.00	A34 - A35	0.03		0.51	
A13 - A14	0.49	0.42	0.38	0.92	A35 - A36	0.00		0.92	
A14 - A15	0.93	0.02	0.67	0.97	A36 - A37	0.07		0.46	
A15 - A16	0.27	0.14	0.44	0.17	A37 - A38	0.40		0.01	
A16 - A17	0.56	0.51	0.06	0.53	A38 - A39	0.25		0.19	
A17 - A18	0.23	0.92	0.00	0.70	A39 - A40	0.50		0.12	
A18 - A19	0.42	0.97	0.52	0.48	A40 - A41	0.10		0.00	
A19 - A20	0.58	0.80	0.00	0.76	A41 - A42	0.16		0.15	
A20 - A21	0.45	0.36	0.44	0.74	A42 - A43	0.79		0.95	
A21 - A22	0.10	0.15	0.16	0.67					

**Table 4.** Comparison of the change of choices A→B between successive sessions with the Conover post-hoc test. Two changes of choices are statistically different when  $p < 0.05$ , and the corresponding cell is red in the table.

Change A→B	PG1	PG2	YG1	YG2	Change A→B	PG1	PG2	YG1	YG2
00→01-01→02	0.00	0.00	0.24	0.69	21→22-22→23	0.79	0.04	0.71	0.12
01→02-02→03	0.00	0.24	0.40	0.04	22→23-23→24	0.43	0.92	0.39	0.18
02→03-03→04	0.01	0.09	0.46	0.01	23→24-24→25	0.99	0.54	0.01	0.00
03→04-04→05	0.00	0.91	0.27	0.16	24→25-25→26	0.04	0.43	0.43	0.14
04→05-05→06	0.66	0.64	0.31	0.63	25→26-26→27	0.25	0.08	0.90	0.15
05→06-06→07	0.00	0.07	0.26	0.86	26→27-27→28	0.01		0.42	0.00
06→07-07→08	0.00	0.13	0.26	0.23	27→28-28→29	0.03		0.67	0.01
07→08-08→09	0.15	0.16	0.72	0.83	28→29-29→30	0.14		0.19	0.01
08→09-09→10	0.00	0.14	0.77	0.18	29→30-30→31	0.00		0.46	0.02
09→10-10→11	0.00	0.00	0.32	0.07	30→31-31→32	0.13		0.21	
10→11-11→12	0.61	0.02	0.09	0.53	31→32-32→33	0.90		0.16	
11→12-12→13	1.00	0.34	0.27	0.38	32→33-33→34	0.45		0.29	
12→13-13→14	0.72	0.42	0.52	0.99	33→34-34→35	0.04		0.17	
13→14-14→15	0.21	0.27	0.00	0.38	34→35-35→36	0.30		0.00	
14→15-15→16	0.00	0.18	0.00	0.83	35→36-36→37	0.30		0.36	
15→16-16→17	0.85	0.10	0.01	0.53	36→37-37→38	0.86		0.78	
16→17-17→18	0.70	0.34	0.00	0.30	37→38-38→39	0.94		0.74	
17→18-18→19	0.19	0.84	0.04	0.16	38→39-39→40	0.37		0.01	
18→19-19→20	0.10	0.55	0.00	0.00	39→40-40→41	0.23		0.02	
19→20-20→21	0.25	0.04	0.00	0.16	40→41-41→42	0.19		0.01	
20→21-21→22	0.08	0.17	0.56	0.81	41→42-42→43	0.71		0.34	

**Table 5.** Comparison of the change of choices B→A between successive sessions with the Conover post-hoc test. Two changes of choices are statistically different when  $p < 0.05$ , and the corresponding cell is red in the table.

Change B→A	PG1	PG2	YG1	YG2	Change B→A	PG1	PG2	YG1	YG2
00→01-01→02	0.00	0.59	0.74	0.18	21→22-22→23	0.25	0.09	0.57	0.63
01→02-02→03	0.00	0.02	0.27	0.01	22→23-23→24	0.96	0.62	0.27	0.01
02→03-03→04	0.07	0.01	0.48	0.13	23→24-24→25	0.66	0.05	0.83	0.14
03→04-04→05	0.00	0.91	0.50	0.79	24→25-25→26	0.12	0.07	0.21	0.31
04→05-05→06	1.00	0.05	0.37	0.20	25→26-26→27	0.05	0.76	0.94	0.01
05→06-06→07	0.00	0.00	0.27	0.93	26→27-27→28	0.00		0.70	0.33
06→07-07→08	0.11	0.01	0.34	0.60	27→28-28→29	0.01		0.83	0.02
07→08-08→09	0.02	0.28	0.89	0.78	28→29-29→30	0.19		0.18	0.31
08→09-09→10	0.33	0.80	0.68	0.41	29→30-30→31	0.00		0.08	0.71
09→10-10→11	0.00	0.00	0.58	0.02	30→31-31→32	0.53		0.09	
10→11-11→12	0.00	0.01	0.01	0.12	31→32-32→33	0.03		0.67	
11→12-12→13	0.12	0.69	0.00	0.12	32→33-33→34	0.01		0.91	
12→13-13→14	0.57	0.75	0.02	0.24	33→34-34→35	0.00		0.83	
13→14-14→15	0.38	0.13	0.00	0.48	34→35-35→36	0.93		0.00	
14→15-15→16	0.00	0.28	0.00	0.95	35→36-36→37	0.65		0.56	
15→16-16→17	0.59	0.11	0.36	0.31	36→37-37→38	0.76		0.95	
16→17-17→18	0.50	0.79	0.07	0.11	37→38-38→39	0.72		0.03	
17→18-18→19	0.93	0.26	0.00	0.41	38→39-39→40	0.02		0.20	
18→19-19→20	0.55	0.51	0.06	0.06	39→40-40→41	0.09		0.03	
19→20-20→21	0.02	0.00	0.09	0.72	40→41-41→42	0.05		0.11	
20→21-21→22	0.47	0.00	0.75	0.88	41→42-42→43	0.96		0.67	

**Table 6.** Non-Casuality, statistically significant differences ( $p < 0.05$ ) in the percentage of transitions of choice B→A vs. A→B for the same session. The cells in red represent statistically significant ( $p < 0.05$ ) differences between the percentages of change in the picture choice A→B and B→A, indicating a deviation from a purely statistical fluctuation of the choices.

	PG1	PG2	YG1	YG2		PG1	PG2	YG1	YG2
S00-01	0.90	0.51	0.64	0.01	S22-23	0.29	0.15	0.45	0.19
S01-02	0.50	0.22	0.59	0.22	S23-24	0.51	0.23	0.60	0.12
S02-03	0.87	0.25	0.41	0.41	S24-25	0.64	0.03	0.15	0.99
S03-04	0.33	0.48	0.81	0.93	S25-26	0.37	0.79	0.94	0.79
S04-05	0.83	0.54	0.54	0.33	S26-27	0.36	0.42	0.98	0.29
S05-06	1.00	0.02	0.55	0.70	S27-28	0.41		0.39	0.04
S06-07	0.76	0.13	0.34	0.57	S28-29	0.36		0.72	0.16
S07-08	0.12	0.17	0.66	0.96	S29-30	0.31		0.13	0.30
S08-09	0.79	0.67	0.91	0.88	S30-31	0.36		0.84	0.42
S09-10	0.00	0.20	0.68	0.10	S31-32	0.15		0.50	
S10-11	0.00	1.00	0.88	0.19	S32-33	0.64		0.49	
S11-12	0.88	0.78	0.55	0.76	S33-34	0.25		0.88	
S12-13	0.63	0.97	0.48	0.90	S34-35	0.21		0.37	
S13-14	0.64	0.45	0.61	0.50	S35-36	0.56		0.83	
S14-15	0.91	0.31	0.71	0.63	S36-37	0.33		0.99	
S15-16	0.33	0.45	0.89	0.69	S37-38	0.27		0.83	
S16-17	0.22	0.42	0.01	0.44	S38-39	0.28		0.11	
S17-18	0.45	0.76	0.00	0.74	S39-40	0.15		0.25	
S18-19	0.16	0.74	0.51	0.46	S40-41	0.14		0.04	
S19-20	0.55	0.61	0.01	0.60	S41-42	0.14		0.35	
S20-21	0.30	0.09	0.39	0.72	S42-43	0.10		0.97	
S21-22	0.18	0.19	0.15	0.63					

As in the previous section, we consider at first a Friedmann test of the whole 50 x <number of sessions> matrix for the focus for the four groups. All these tests indicate a significant deviation from purely random fluctuations. Following this, we compare each session with the following one using the Conover post-hoc test for each group. The results can be seen in **Figure 9** and **Table 7**.



**Figure 9.** Comparison of the percentage of A->B+B->A changes between successive sessions for each group as calculated with the Conover test following a Friedmann test on the totality of the percentages.



**Table 7.** Comparison of the flux of choices A→B+B→A between successive sessions with the Conover post-hoc test. Two changes of choices are statistically different when  $p < 0.05$ , and the corresponding cell is red in the table.

A→B+B→A	PG1	PG2	YG1	YG2	A→B+B→A	PG1	PG2	YG1	YG2
00→01-01→02	0.00	0.01	0.49	0.30	21→22-22→23	0.45	0.11	0.96	0.10
01→02-02→03	0.00	0.33	0.77	0.00	22→23-23→24	0.55	0.97	0.62	0.51
02→03-03→04	0.29	0.07	0.87	0.13	23→24-24→25	0.68	0.38	0.14	0.00
03→04-04→05	0.00	0.83	0.24	0.24	24→25-25→26	0.00	0.95	0.85	0.01
04→05-05→06	0.71	0.45	0.62	0.11	25→26-26→27	0.01	0.34	0.88	0.01
05→06-06→07	0.00	0.53	0.74	0.95	26→27-27→28	0.00		0.42	0.00
06→07-07→08	0.00	0.50	0.80	0.25	27→28-28→29	0.00		0.84	0.95
07→08-08→09	0.73	0.66	0.99	0.93	28→29-29→30	0.03		0.79	0.09
08→09-09→10	0.00	0.75	0.88	0.11	29→30-30→31	0.00		0.73	0.13
09→10-10→11	0.33	0.00	0.27	0.94	30→31-31→32	0.09		0.25	
10→11-11→12	0.00	0.00	0.00	0.06	31→32-32→33	0.07		0.45	
11→12-12→13	0.18	0.91	0.00	0.16	32→33-33→34	0.00		0.85	
12→13-13→14	0.54	0.79	0.00	0.88	33→34-34→35	0.00		0.52	
13→14-14→15	0.07	0.08	0.00	0.54	34→35-35→36	0.36		0.01	
14→15-15→16	0.00	0.05	0.00	0.68	35→36-36→37	0.21		0.09	
15→16-16→17	0.52	0.82	0.62	0.35	36→37-37→38	0.69		0.76	
16→17-17→18	0.77	0.22	0.14	0.20	37→38-38→39	0.75		0.05	
17→18-18→19	0.26	0.37	0.69	0.04	38→39-39→40	0.01		0.18	
18→19-19→20	0.07	0.46	0.01	0.02	39→40-40→41	0.02		0.94	
19→20-20→21	0.00	0.01	0.28	0.29	40→41-41→42	0.01		0.37	
20→21-21→22	0.04	0.42	0.63	0.85	41→42-42→43	0.78		0.56	

We now consider the focus, i.e., the difference of the changes of choice B→A-A→B that gives us the tendency to converge toward the initial choice—if positive—or to move away from it—if negative. The results can be seen in **Figure 10** and **Table 8**.

### 3.4. Evolution of Non-Casuality, Flux, and Focus in Time

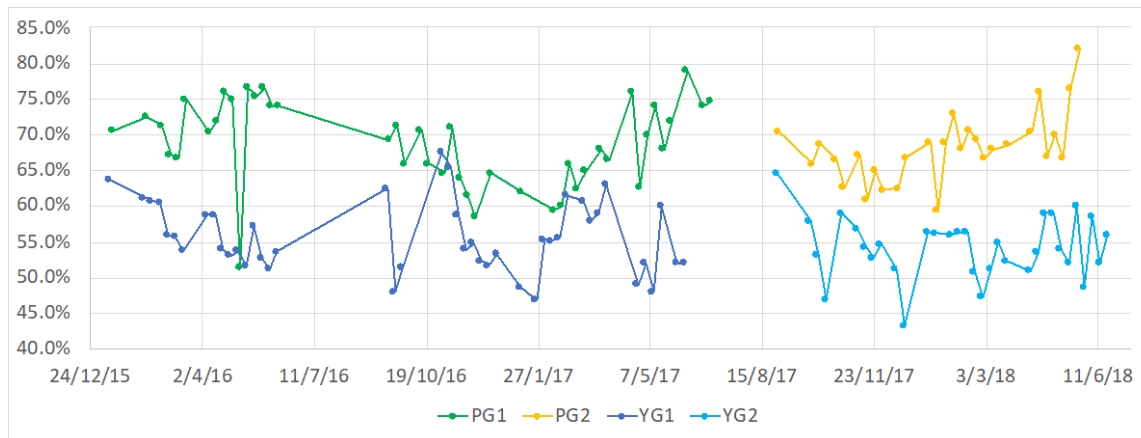
In **Figure 11**, we show the evolution of the percentage of A’s choice in chronological order for the four groups.

In **Figure 12**, we show the statistically significant differences between sessions for the percentage of A’s choice and the percentage of A→B and B→A transitions in chronological order for the four groups. For the latter two, we use the notation explained in the section “Evolution of the transitions between questionnaires.”

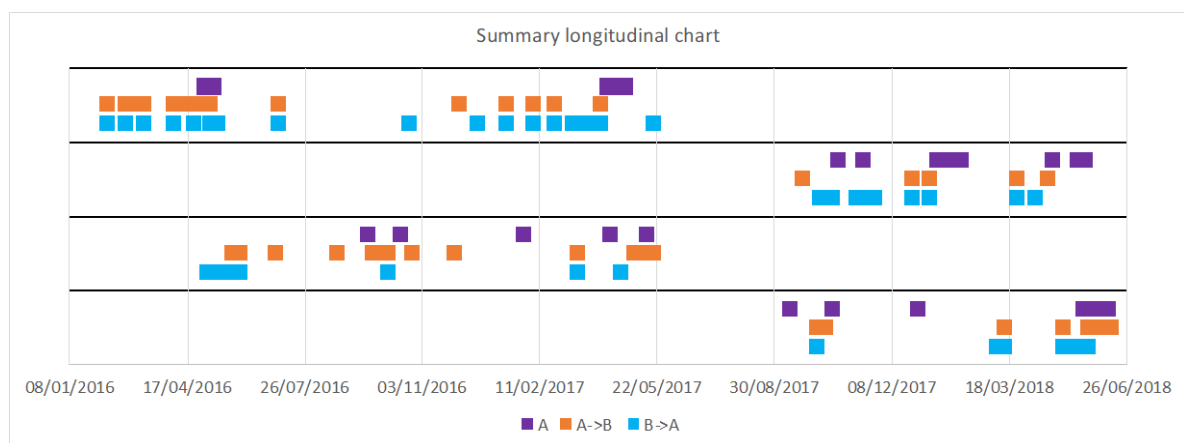
Considering the choice of A, we show the statistically significant comparisons between consecutive sessions, including the questionnaire zero completed before the beginning of the training. For the transition A→B and B→A, we use the



**Figure 10.** Comparison of the percentage of the B->A->B changes between successive sessions for each group as calculated with the Conover test following a Friedman test on the totality of the percentages.



**Figure 11.** Evolution of the percentage of A’s choice in chronological order for the four groups.



**Figure 12.** Statistically significant differences between sessions for the percentage of A’s choice and the percentage of A→B and B→A transitions in chronological order for the four groups.

notation explained in the section “Evolution of the transitions between questionnaires.”

In **Figure 13**, we show the statistically significant differences between sessions for the percentages of focus ( $B \rightarrow A - A \rightarrow B$ ), flux ( $A \rightarrow B + B \rightarrow A$ ), and non-casuality ( $A \rightarrow B$  vs.  $B \rightarrow A$ ) transitions in chronological order for the four groups. This allows us to determine whether there is a correlation between non-casuality, flux, and focus during the four groups’ chronological evolution. We remember that we have explained the notation used for the questionnaire number in the section “Evolution of the transitions between questionnaires.”

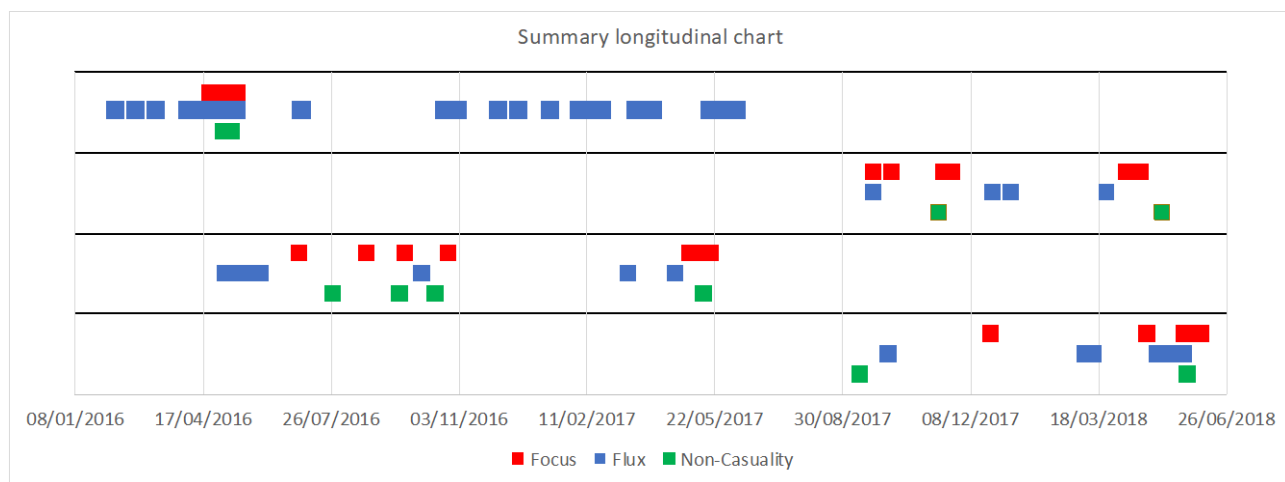
## 4. Discussion

### 4.1. Theoretical Framework

We believe that the best way to study the unconscious is to observe its amplification in group dynamics. As it happens in quantum mechanics, the problem of measurement is central also in psychophysics because the unconscious is, by definition, unknowledgeable and not only because it is “unconscious” but also

**Table 8.** Comparison of the focus of choices B→A-A→B between successive sessions with the Conover post-hoc test. Two changes of choices are statistically different when  $p < 0.05$ , and the corresponding cell is red in the table.

B→A-A→B	PG1	PG2	YG1	YG2	B→A-A→B	PG1	PG2	YG1	YG2
00→01-01→02	0.68	0.02	0.42	0.09	21→22-22→23	0.29	0.02	0.40	0.47
01→02-02→03	0.21	0.01	0.16	0.84	22→23-23→24	0.54	0.88	0.26	0.01
02→03-03→04	0.19	0.28	0.24	0.50	23→24-24→25	0.76	0.39	0.08	0.17
03→04-04→05	0.70	0.93	0.92	0.39	24→25-25→26	0.74	0.09	0.19	0.76
04→05-05→06	0.76	0.11	0.80	0.70	25→26-26→27	0.47	0.37	0.74	0.49
05→06-06→07	0.96	0.00	0.21	0.95	26→27-27→28	0.45		0.31	0.01
06→07-07→08	0.11	0.01	0.24	0.69	27→28-28→29	0.72		0.62	0.00
07→08-08→09	0.04	0.14	0.64	0.68	28→29-29→30	0.95		0.10	0.02
08→09-09→10	0.00	0.35	0.73	0.23	29→30-30→31	0.51		0.25	0.10
09→10-10→11	0.00	0.30	0.79	0.01	30→31-31→32	0.57		0.38	
10→11-11→12	0.00	0.80	0.63	0.36	31→32-32→33	0.10		0.25	
11→12-12→13	0.12	0.71	0.28	0.80	32→33-33→34	0.12		0.42	
12→13-13→14	0.83	0.56	0.26	0.50	33→34-34→35	0.44		0.55	
13→14-14→15	0.76	0.78	0.98	0.65	34→35-35→36	0.51		0.51	
14→15-15→16	0.09	0.12	0.50	0.88	35→36-36→37	0.72		0.81	
15→16-16→17	0.78	0.64	0.04	0.27	36→37-37→38	0.91		0.81	
16→17-17→18	0.41	0.72	0.00	0.67	37→38-38→39	0.82		0.13	
17→18-18→19	0.36	0.27	0.00	0.74	38→39-39→40	0.23		0.03	
18→19-19→20	0.45	0.35	0.06	0.19	39→40-40→41	0.68		0.01	
19→20-20→21	0.37	0.32	0.00	0.51	40→41-41→42	0.59		0.02	
20→21-21→22	0.46	0.01	0.33	0.70	41→42-42→43	0.84		0.47	



**Figure 13.** Statistically significant differences between sessions for the percentage of focus (B→A-A→B), flux (A→B+B→A), and non-casuality (A→B vs. B→A) transitions in chronological order for the four groups.

because the “detector” is the cognitive part of the individual, which is deeply influenced by, and indeed built upon, the unconscious.

This analogy relies on the observation that group dynamics, as described by

Bion's "basic assumptions," is similar to individual dynamics, in particular in the crucial aspect of the analogy of the mourning process in the individual with the loss of the ideal leader in the group, inspired by the Oedipean constellation.

Considering the simultaneous presence of potentially connected individuals, we have made the hypothesis that the entanglement effects could be more pronounced in the case of a group setting. We call this "quantum amplification." As said in the Introduction, Jung (Jung & McGuire, 1925) was aware that the individual psyche is tributary of a layered unconscious, where the layers are the "collective unconscious" of larger and larger groups, such as the family and society.

Jung also speaks of amplification (Jung & Hull, 1911). For Jung, the "amplification" is the extension and the deepening of a dream-like image by means of associations centered on the dream theme and associations based upon social studies and the history of symbols (mythology, mysticism, folklore, religion, ethnology, art, etc.). Thanks to this, the dream becomes accessible to interpretation (Jung, 1962). If we consider the analogy conveyed by the term "amplification" in the two contexts, unconscious mental processes like dreams can be regarded as "microscopic" quantum processes, becoming accessible to conscience only via an amplification and measurement process, in this case, operated by consciousness. This is one more example of the interesting parallels that we can draw between quantum physics and psychodynamics.

In the case presented in this article, we can suppose that the group situation generated by the DBT skills training is influenced not only by the individual and family situations but also by the environment, such as the large social group.

In quantum physics, a microscopic process is "amplified" by the "observer" to the macroscopic level, allowing the measurement to take place. Thus, only after amplification, we can observe a microscopic quantum process as a physical phenomenon via an act of measurement. However, the irreversibility of such an act is still an open argument of discussion.

The perspective of this study is to observe if the group dynamics—particularly in a slow-open setting—is also affected by the environment (as in quantum mechanics).

In the present experiment, we noted some differences between parents and adolescents—for example, in the numbers of sessions, similar to what we have observed in one of our previous work of ours (Fernandez-Rivas et al., 2020)—but the comparison between parents and adolescents groups will be the subject of a future study.

## 4.2. Percentage of A's Answers

The most striking aspect of our data is that the answers to the questionnaire zero, administered before the training, are very skewed, with values of A's percentages respectively of 70.6% for PG1, 70.5% for PG2, 63.7% for YG1, 64.7% for YG2. This is similar to what we found in a previous study of DBT closed groups

(Fernandez-Rivas et al., 2020; Trojaola-Zapirain et al., 2019) at the end of the training.

We observed an increase to 74.7% for PG1 and to 82% for PG2, and a reduction to 52% for YG1 and 56% for YG2.

The trends in the changes of the A's answers are different in the four groups, and it is interesting to note that both groups of parents, PG1 and PG2, show an increase in the choice of the initial preferred image (+4.1% and +11.5%) while both groups of young YG1 and YG2 show a decrease (−11.7% and −5.6%).

### 4.3. Analysis of “Flux” and “Focus” of the Answers

The changes  $A \rightarrow B$  and  $B \rightarrow A$  in each of the four groups are similar, and this is confirmed that there are few non-casuality significant differences. We recall that we indicate as non-casuality the fact that the changes  $A \rightarrow B$  and from  $B \rightarrow A$  are not in equilibrium, i.e., the percentage of changes of the 50 questions are not statistically comparable for the two directions.

The flux, being the sum of  $A \rightarrow B$  and  $B \rightarrow A$ , presents statistically significant values almost at the same moment as  $A \rightarrow B$  and  $B \rightarrow A$ . On the other hand, the statistically significant values for the focus are less than in  $A \rightarrow B$ ,  $B \rightarrow A$ , and flux.

The interpretation of this observation is not simple: if we imagine that the originally preferred answer—the A answer of the questionnaire zero—is the “personal” answer independent from the influence of the group, we can suppose that the return to this choice signals a movement “against” the “group continuum” and toward loyalty to the familiar and social clan that we can define as “normal clanity.”

The PG1 group shows many significant variations of the flux (but also of  $A \rightarrow B$  and  $B \rightarrow A$ ) between different sessions, more than in the other groups. We note that focus and non-casuality present significative differences in the same phase of the training, i.e., before the 20<sup>th</sup> session and at the end of the training (except for PG1). This is consistent with the “canonical” group evolution. At the beginning of the training, the group experiences the groupal disillusion. At the end, the group reacts against and mourns the conclusion of the experience, and participants tend to return to their normal clanity to preserve themselves from the group's disillusion/demise.

### 4.4. Longitudinal Analysis

Because the groups had a training and therapeutical goal, the fact that some groups took place simultaneously was casual and independent from the research objectives. Nevertheless, this overlap in time of the different groups allows a comparison of their evolution in time. Probably because of the slow-open structure of the groups, we observed some coincidence in their evolution which could depend more on external factors than on the group's internal evolution.

If we observe the group evolution in calendar time rather than in the number of sessions, we see the same coincidences in the statistically significant values of

some of the parameters considered ( $A$ ,  $A \rightarrow B$ ,  $B \rightarrow A$ , flux), which seem to obey not only the internal evolution of the groups but also other possible external factors. This coincidence was not present for non-casuality and focus.

We underline that if the flux is the expression of changes from  $A$  to  $B$  plus  $B$  to  $A$ , the non-casuality indicates the statistical difference of the transitions  $A \rightarrow B$  and  $B \rightarrow A$ , and the focus, defined as  $B \rightarrow A$  minus  $A \rightarrow B$ , is the expression of the tendency to revert to the initial choice of pictures before the beginning of the training.

The interaction with the external environment in slow-open groups is probably experienced by the participants in an interactive mode with important *clan* loyalties: the high “orientation” ( $A$ ’s choices before the constitution of the group) is “recovered” and in a group even exceeded during the sessions and the answers are less *casual* (less 50%) than in a state of “group continuum.” We note that the participants remain in the group for more or less than 10 - 12 sessions. Therefore, we can suppose that the slow-open group promotes a “clan continuum” due more to the external environment than a group continuum.

## 5. Conclusion

We conducted this experiment in 2017-2019 during Dialectical Behavior Therapy skills training at the Psychiatric Service of Basurto University Hospital in Bilbao, Spain. Results of similar experiments have been reported in previous publications (Fernandez-Rivas et al., 2020; Trojaola-Zapirain et al., 2014, 2015, 2016, 2019). The main conclusion of these studies was that the data were suggesting evidence in favor of the building of a group unconscious following Bion’s “basic assumptions,” where a strong interaction between the psyches of the group participants is established at the very beginning of the group experience, and then it slowly evolves under the known group dynamics. To describe this phenomenon, Bion has introduced the concept of “valency,” indicating the immediacy of the basic assumptions’ onset, more analogous to tropisms than to purposive behavior. This effect is enhanced in the group setting by an amplification process whereby groups “amplify emotional reactions, resulting in a combustible process of emotional contagion” (Bion, 1961).

The difficulty of verifying any theory of the unconscious is that we have no way to perform a direct measurement (Atmanspacher, 2004; Cerf & Adami, 1997, 1998). To circumvent this problem, we have devised an indirect measure based on a questionnaire to be answered by the participants in a group situation.

It is interesting to note that such an experiment is trying to determine whether a psychic situation—the supposed entanglement of the individuals’ unconscious in a group situation—has an actual effect on the material world—the answers provided to a questionnaire.

As we said above, the interpersonal relations in the group situation may have a relaxing effect on the neurotic attitudes with a consequent recovery of otherwise non-accessible psychical energy. Otherwise, particularly for adolescents, the



feeling of identity loss could bring stress and anxiety and ultimately provoke the exit from the group when the “orientation” (A’s choices) is minimal, and the *confusion* is highest. Psychoanalytically, we would call this a resistance to change. Conflicts in *clan loyalties*, common in adolescents when moving from the family envelope to the friends one may create a strong discomfort and lead to a flight from the group situation. The loyalty to the clan is more stable for the parents, and the return to the choice of the initially preferred image is clearly present. For the young participants, the groupal experience is more influencing and the return to the initially chosen image less marked. The group continuum comes from the entanglement of individual psyches toward forming a group unity having its own identity, in this case, a group identity. We can suppose that in slow-open groups, this entanglement is weaker than in closed groups. In slow-open groups, the influence of the external environment seems to be more important, and the conflict between friend clan, family clan, and group clan more manageable.

It might be interesting to attempt to derive some social and practical implications based on the research results, although this is not the primary purpose of the present work. Our study confirms that the slow open setting is the most adapted for the adolescents because it minimizes the adverse effects of the dropouts typical for this population. While there is a substantial turnover of participants, and the group population oscillates considerably—at least from the perspective of our data—the conflict between clanic loyalties (families and peers, e.g., friends) and the DBT group seems manageable, and the dropouts limited. This could suggest that the slow open setting plays an important role in creating an effective training and therapeutic environment for a population that is demanding but also challenging to treat consistently.

The participation in the Dialectical Behavior Group Therapy is probably reinforced by the slow-open setting, allowing adolescents and parents to experience a moderate conflict with clanic preexistent loyalties and a more relaxed interaction with group continuum.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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