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TITLE:

The Adventures of Fundi Intervention Based on the Cognitive and Emotional Processing in Attention Deficit Hyperactive Disorder Patients

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SUMMARY:

This protocol illustrates a remedial therapy based on inductive learning and indirect communication (Ericksonian metaphorical hypnosis) that can be applied to children with Attention Deficit Hyperactive Disorder (ADHD). Particularly, this protocol is intended to test the effectiveness of a go/no-go decision task. Neuroscientific rationale is presented throughout the text.

ABSTRACT:

Many children with attention deficit hyperactive disorder (ADHD) are known to have executive dysfunction, which weakens their abilities to learn and behave in daily living. This protocol describes the methodology that is required for the intervention (psychotherapy) based on planning, attention, successive, and simultaneous (PASS theory) cognitive processing and fear emotional processing. It provides guiding principles and practical recommendations. A disproportionately high level of fear (dysregulation) increases the vulnerability for dysfunction in learning and behavior. We explain the interplay between emotion and cognition at the neurological level.

A go/no go task (The Adventures of Fundi), which involves decision making, is administered in a PC- mode to a sample of 66 ADHD subjects. The Adventures of Fundi, a computer program, was

constructed to induce successive or simultaneous processing when involving the training of planning and selective attention. It aims to improve the executive function with planning and selective attention. If executive function improves, learning improves, and behavior ameliorates. After intervention over 6 months, remission was achieved in 70% of subjects.

The instructor encourages the use of appropriate strategies and points out the ways in which the strategies can be useful in finding the solution to the problem (go/no go). The emphasis is not on rehearsing and adult instructed verbal sequence. The verbalization may reveal the conscious verbalized strategy to solve a task that is not really the strategy being unconsciously used in that case. A self-verbal report is unreliable. This is an inductive learning rather than deductive rule-learning approach central to cognitive PASS training. This inductive training has proved to produce not only near transfer but also far transfer.

Noncognitive factors (emotional factors) must be considered to maximize the benefit of cognitive training. Indirect and metaphorical communication considers the emotional factor.

INTRODUCTION:

Decision making is linked to the behavior and most behaviors implies decision-making. Decision making, and, also learning, involves both cognitive and emotional processing. The cognitive processing can be conceptualized and assessed according to the planning, attention, successive and simultaneous (PASS) theory of intelligence¹⁻⁹. According to PASS, any behavior is the output of neurological central information processing¹⁰. Therefore, paying attention must be considered a behavior that is independent of the central processing of information^{1-3,7-12}. One may not pay attention (observable behavior), but the central attention processing may be working on something different. On the other hand, the emotional processing includes the fear processing responsible for self-confidence (self-esteem) or lack of confidence¹³⁻¹⁵. The fear processing is the underlying undifferentiated autonomic physiological basis of all emotions. Like most emotions (or “affects” or “moods”), fear begins in the amygdala, an almond-shaped structure responsible for detecting threats to our well-being.

Both the cognitive and the emotional processing can happen consciously or more often unconsciously, which is a crucial point to substantiate the diagnosis and intervention of ADHD behavior or any other behavior. Growing and converging neuroscientific evidence indicates that not only unconscious-involuntary processing¹⁶⁻²¹ but also anticipatory unconscious processing²²⁻³⁵ are true in decision-making. Particularly, a new study on the neuroscience of the interpersonal unconscious (implicit) subliminal communication is evidence of this³⁶.

Decision-making is based on the self-confident feeling associated with what it is cognitively processed, implicitly more frequently than explicitly³⁷⁻⁴¹. The self-confidence is associated with self-concept (beliefs of the knowledge base), but we claim that decision-making is based on what one feels consciously and unconsciously, but not on deliberate rational calculation of consequences³⁸. In fact, the rational arguments that people express (verbal report) to explain behavior and decision-making are a posteriori phenomenon and a cognitive bias⁴²⁻⁴³ triggered by the fear processing. First, reaction to feeling occurs, and then an explanation is

unconsciously implemented as a posteriori phenomenon. A self-verbal report is questionable. Cognition/emotion research is plagued by problems in which it is not clear what is the emotion response. This is the path to understand the emotional fear response. Therefore, decision making, self-confidence and behavior are closely linked.

From the viewpoint of therapeutic intervention, how exactly should the intervention be carried out? What should be the common and essential properties of the procedure of intervention, mediation, or teaching? Considering the previously expressed procedures, inductive learning² and indirect communications (metaphor and Ericksonian hypnosis)^{14,44} are recommended. Growing and converging evidence from neuroscientific investigations⁴⁵⁻⁵³ shows some neurological mechanisms of the indirect communication.

Concerning inductive learning, the emphasis is on the child's solution to the task, not on rehearsing an adult instructed verbal procedure. It aims at enhancing the processing strategies that underlie the task, while avoiding direct teaching of skills. Successful inductive learning is an experience that provides a growth of the self-concept of personal abilities, and so a growth of self-confidence. In contrast, direct teaching involving more-of-the-same kind of work turns off the interest and motivation. The distinctive feature here is the tacit acquisition and use of appropriate processing strategies in contrast to instruction learning; this is the inductive rather than the deductive rule-learning approach. The child must see the insufficiency in the old approach or strategy and the need for developing a new strategy.

Here, we have shown the foundation (rationale) of the technique Fundi's Adventures as a tool of remedial therapy to apply it in the clinical setting. There are no published previous studies with this program Fundi's Adventure. The main advantage of this procedure is that it is not based on the self-verbal report. In contrast, countless alternative techniques are based on deductive learning, direct communication and literal interpretation of the self-verbal report.

In the example presented in this manuscript, Fundi's Adventure intervention was performed in Attention Deficit Hyperactive Disorder (ADHD) patients. ADHD is a behavioral dysfunction in terms of inattentive, hyperactive, and impulsive behavior, which involves a dysfunctional decision making¹². Any behavior implies decision making. ADHD is likely caused by a combination of genetics and earlier experience. The overall goal of this protocol is to test the hypothesis about the effectiveness of a go/no-go decision task (Fundi's Adventures) based on both inductive learning and indirect communication in a sample of ADHD children. It has been reported that the basic neuropsychological constructs of the go/no-go task are preserved in the emotional investigation⁵⁴.

PROTOCOL:

The protocol follows the guidelines of Fundació Carme Vidal human research ethics committee. Inform consent was obtained.

1. Recruitment of the subjects

NOTE: Recruitment was performed as per the previously published literature¹².

1.1. Recruit children with ADHD without comorbidity. In the present study, 66 children, aged 13-15 years, mean 13.89 years with SD \pm 0.8, 47 males and 19 females, were recruited. Have trained psychotherapists (qualified in psychology) or psychiatrists perform the procedure of recruitment.

1.2. Get informed consent from the patient or the caregivers.

1.3. Practice a discerning clinical history. As needed, perform the following studies: cardiological examination, both auditory and visual event-related potential, thyroid study, sonography, video-EEG, otorrinolaringology exploration, ophthalmological exploration, rule out both previous medication and comorbidity, as well as, any child psychiatric disorders or any other therapy in progress. Use any registered personal medical history available.

1.4. Ask a pediatric neurologist to confirm the diagnosis using DSM-IV⁵⁵ or DSM-V⁵⁶. Ask a psychiatrist to rule out comorbidity.

1.5. Complement the diagnosis using another useful criterion like parent and teacher rated Swanson, Nolan, and Pelham scale 18 (SNAP-IV-18) for ADHD symptoms (Swanson, 1995)⁵⁷ as used in this protocol.

1.5.1. Use the narrow band behavioral scale, like SNAP-IV, which is more specific for the diagnosis of ADHD and often correlates with the definition in DSM-V. In this study, all children met the criteria for ADHD combined type at baseline. All 66 children scored \geq 2.5/1.8 (teacher/parents) in SNAP-IV.

NOTE: SNAP-IV consists of 18 items and can be filled in by parents and teachers. The items are questions about the occurrence frequency of a series of behavioral characteristics. The answers range from zero (no or not at all), 1 (yes, a little), 2 (yes, quite a lot) to 3 (yes, a lot). A total score can be obtained by adding the values of all the items and dividing by 18. The cutoff point is different according to the response of the parents (1.78) or the teacher (2.56).

1.6. Perform an unstructured interview of parents and teachers focused on collecting (confirming) data on behavior as mentioned in the SNAP-IV in to have sufficient information to make the diagnosis.

1.6.1. Use the unstructured interview that is more informal and open-ended. There is a high probability that they will give 100% truthful answers. In the present study, each case was assessed by two blinded researchers and inter-observer agreement of 80% was required. The ADHD diagnostic interview was completed face-to-face with the child's principal caregiver by trained research interviewers.

1.7. Use inclusion criteria: combined ADHD according to DSM-IV⁵⁵ or DSM-V⁵⁶ and SNAP-IV-18 or similar one. Also, use the following exclusion criteria: any child psychiatric disorders or any previous medication or any other therapy.

2. Procedure

2.1. Cognitive assessment

NOTE: This was done by administering CAS test⁴ which was performed as per the previously published literature¹².

2.1.1. Measure the cognitive function of participants by applying the Cognitive Assessment System (CAS).

2.1.2. Use a battery like CAS that assesses PASS processing of information: planning, attention, successive and simultaneous.

2.1.3. Record the raw score for each test to be transformed into a standard score according to manual instructions.

NOTE: For the four PASS processing, a standard score with a normative mean of 100 was used with a standard deviation (SD) of 15. For three subtests in each of the four scales, the mean is 10 and the SD is 3.

2.1.4. Repeat this assessment using again the CAS battery at month 6 after the application of the program "The Adventures of Fundi".

2.1.5. Compare the results between the score of each cognitive process at baseline and the 6-month follow-up scores.

NOTE: The 6-month follow-up, without pharmacological intervention, allows ruling out the potential "practice effect" of two closely spaced psychological tests.

2.2. Behavioral assessment

NOTE: This was performed by administering the SNAP-IV-18

2.2.1. Administer the SNAP-IV questionnaire (Swanson, 1995)⁵⁷ at baseline, that is, values against which all performances will be compared. After intervention. Record the remission versus the response in each case. Calculate the percentages of remissions and responses in the entire sample.

NOTE: Remission is defined as a mean total score of 1 on most standardized questionnaires. On the contrary, the response has been usually defined as amelioration in symptoms of at least

25% with disappearance of the malfunctioning DSM-V criteria. Therefore, remission is associated with a loss of diagnostic status and optimal functioning. Remission is optimal, but the response not so much.

2.2.2. Put into practice a regular follow-up communication with the child's caregiver (parents and teachers) to review the caregiver concerns, evaluate progress, and provide advice and support (e.g., monthly telephone calls).

2.3. The Adventures of Fundi - Go/No go task

2.3.1. Show to the participant five short videos on how the brain learns before starting the game of "The Adventures of Fundi". These videos are named "Fundi and the Brain". In these supplementary videos, the four cognitive processes described by the PASS theory (planning, attention, simultaneous and successive) are explained through a metaphor.

NOTE: Remember, the indirect metaphorical communication implies inductive learning and indirect communication that makes remediation less painful or more enjoyable. A knowledge is being communicated considering the emotional impact.

2.3.2. Explain the objective of the game of cognitive intervention "The Adventures of Fundi" to the participant: "It seeks to train the brain to facilitate academic learning. Above all, it pursues the self-regulation of the student supported by the PASS cognitive process of planning."

2.3.3. Have the participant enter the page: <http://www.fcarmevidal.com/aventures/> and click on the language to work with.

2.3.4. Provide them with a username and a password so that the participant can start the session (e.g., login: jove / password: jove).

2.3.5. Click on the first country (**1-Paris**).

2.3.6. Read the screen and click the **Continuar** button. Perform this step in the same way for each of the nine screens.

2.3.7. Ask the child to solve the proposed task. The first task involves clicking on the boy's face every time it appears on the screen.

2.3.8. Read the screen results and click **Continuar**.

2.3.9. Ensure that the game provides a code that the child must remember to input in the next screen. Start the game again from the beginning if he/she does not remember the code.

2.3.10. Repeat step 2.3.4 but with the next country.

265 2.3.11. End the session after about 40 min.

266
267 2.3.12. Inform the child that he will have to figure out a way to remember the code and the
268 country in which the session ended to continue the next day.

269
270 2.3.13. Perform one session every week for six months.

271
272 2.3.14. Intervene making use of indirect communication. If during the session, the participant
273 makes a mistake, the game itself will indicate that he/she must repeat the task. The most
274 important thing is that in the second attempt, the participant solves the task correctly. One
275 example is presented below.

276
277 2.3.14.1. If the child makes a mistake, and he does not solve a task, say: "Oh! what's happened?
278 Do you know?" Let the child answer if he does.

279
280 2.3.14.2. Then continue, "I think we were tricked. This happens. Maybe our hand went quicker
281 than our brain." Observe the child's body language.

282
283 2.3.14.3. If the child nods, suggest to them to try again but using a stop signal. This signal can be
284 visually presented or can be presented as a clue (e.g., lifting the palm of his hand).

285
286 NOTE: Techniques used in indirect communication include metaphors, introductory phrases,
287 saturation of channels of information, indirect questions, hypothetical phrases, ambiguous
288 terms, silence, dissociation, paradox, false alternative options, melodramatic expression or
289 confusion, prescription of the symptom, and post-trance amnesia.

290
291 2.3.15. If the therapist observes the child repeats the error and he/she is blocked, use some
292 metaphor (Ericksonian hypnosis) to change the belief that is blocking the participant. An
293 example is presented below.

294
295 2.3.15.1. If the blocking belief is "I am not able to do this task", use a pacing prescription like:
296 "Maybe, at this moment, we feel bad because we know we have failed but look, I am going to
297 explain to you a very interesting story, do you agree?"

298
299 2.3.15.2. If the child nods, narrate a story to motivate them. Now, ask them to repeat the task.

300
301 2.3.16. Intervene through indirect communication if the child solves the task using a strategy
302 that is inappropriate and they do not modify it without help. If the metaphor can allow the
303 participant to see other alternatives or other strategies, allow them to solve the task
304 successfully.

305
306 2.3.17. Use inductive learning and indirect communication throughout the procedure. The
307 effect of the procedure lies in communicating knowledge (messages) without transmitting pain
308 or discomfort, whether consciously or unconsciously. This requires interpreting body language

and verbal language as a transmitter of feeling. Self-verbal report is unreliable. This experience increases self-confidence.

NOTE: Both indirect communication (what it is) and its rationale are explained in the discussion section.

REPRESENTATIVE RESULTS

A random, prospective, longitudinal, uncontrolled, analytical study (before – after) was designed. We recruited 66 pharmacologically untreated combined ADHD children according to DSM-V criteria, aged 13-15 years with a mean of 13.89 years with $SD \pm 0.8$ (47 males and 19 females). They also met ADHD criteria according to SNAP-IV-18. Statistical analysis was conducted using a paired Student t-test and effect size statistics (Cohen's δ) was applied.

All 66 children in the study totally scored $\geq 1.8/2.6$ (parents/teachers) in SNAP-IV. To obtain the inattention score, the scores of the first nine questions were added and divided by 9. The cutoff point of the parent inattention scale was 1.44 and the cutoff point of the teacher scale was 1.78. All 66 children in this study scored $\geq 1.6/2.0$ (parents/teachers) in the inattention score. To obtain the hyperactivity/impulsivity score, the scores of the last nine questions were added and divided by 9. The cutoff point of the parent's hyperactivity/impulsivity scale was 1.67 and the cutoff point of the teacher's hyperactivity/impulsivity scale was 2.0. All 66 children in the study scored $\geq 1.8/2.6$ (parents/teachers) in the hyperactivity/impulsivity score .

Concerning CAS assessment, simultaneous tests were conducted by presenting nonverbal matrices, verbal-spatial relations, and figure memory. Successive tests were conducted by presenting word series, sentence repetition, sentence question (from 8 to 17 years) and successive speech rate (from ages 5 to 7 years). Planning tests were conducted by matching numbers, planned codes, and planned connections. Attention tests were conducted by checking expressive attention, number detection, and receptive attention. These four tests were performed in random order for all participants.

Extensive reliability and validity information can be accessed via interpretive handbook. Full Scale reliability is 0.96 with the PASS Scale reliabilities ranging from 0.83 to 0.93. Internal consistency and test-retest reliability studies were conducted. The booklets are intended for paper and pencil responses.

Table 1 shows that in PASS processes, both planning ($p= 0.000$, Cohen's $\delta = 2.32$) and attention ($p = 0.000$, Cohen's $\delta = 1.64$) were ameliorated at a statistically significant level after intervention over 6 months with a large difference effect with planning rather than attention. On the other hand, after intervention over 6 months, remission was achieved in 70% of subjects (e.g., 70% of subjects achieved a loss of diagnostic ADHD criteria). The other 30% of subjects achieved a criterion of response, a reduction in malfunctioning manifestations of at least 25%.

FIGURE AND TABLE LEGENDS:

Table 1: Comparison of PASS processing before and after remediation. (A) t-Student paired samples were applied in order to prove significance ($p < 0.05$). Planning and attention processes ameliorate significantly. **(B)** Cohen's Size Effect confirms a large difference effect in both planning and attention processes.

DISCUSSION:

As expected, the training, Adventures of Fundi, was useful to intervene in ADHD behavioral dysfunction based on both the PASS cognitive processing and self-confidence emotional processing. The success is in terms of better cognitive processing and better behavior. The better cognitive processing is mainly in planning and not so much in attention (**Table 1**). PASS planning and selective attention join the executive function. It is well known that a better executive function is associated with a better behavior, therefore, we can expect improved behavior in an ADHD sample. The remedial procedure involves inductive learning and an emotional communication technique promoting self-confidence that can, at least in part, explain the results. The effectiveness of inductive learning has been previously and sufficiently demonstrated^{2,6,8}.

On the other hand, moods, even positive ones, interfere with the central cognitive tasks (memorizing complex materials, detecting contradictions in texts, etc.). Arguments must be focused on finding how the improvement in self-confidence happens. Self-confidence is the result of subtracting safe-confident experiences from unsafe-unconfident experiences throughout life. The safe experiences throughout life determine the confidence. The improvement in executive function and the inductive learning provide a safe-confident experience, but the more innovative point is that the Ericksonian indirect communication metaphor is a powerful tool to generate self-confidence, communicating well-being unconsciously¹⁶⁻²¹ rather than consciously. Much of the behavior consists precisely in the automatic functioning. Self-confidence is the key point to improve cognition (and learning) and emotion and consequently behavior. Therefore, we can expect better ADHD behavior.

We are developing a rationale for supporting the effectiveness of this technique as a procedure for promoting self-confidence. Supporting evidence is being reported to measure emotion (well-being and discomfort) objectively, in terms of behavioral and physiological changes. Not only emotional response can be objectively studied, like body language, facial expressions, tone of voice, etc., but also psychophysiological responses can also be studied such as, skin conductance, heart rate, and so on⁵⁸. The role of body language in expressing unconscious processing and implicit (unconscious) decision well described in previously published literatures^{7,44}.

Many body expressions tell us about cognition and emotion. For instance, eyes down and to the left or to the right show body sensations; eyes level and to the left or to the right show successive processing; eyes up and to the left or to the right show simultaneous processing, etc. Other examples of informative body expressions are as follows: shoulders relaxed and drooped and breathing deeply in the abdominal area (as in breathing from the diaphragm) depicts tranquility and relaxation. In contrast, wrinkled forehead and/or contracted jaw and/or

shoulders thrown back and/or shallow breathing in the chest and/or a fixed grin show tension and concentration among other expression: unusual posture, rigid body, rocking back and forth or side to side, leaning to one side, head turns, facial expression (mouth and eyebrows), startled look, big grin on the face, eye contact, yawning, specific hand movements, particular words or phrases, voice quality and pitch, tempo (rhythmic, choppy), volume, tone, inflection, speed, and so on.

This technique is based on the cognitive and emotional unconscious processing for diagnosis and treatment. In contrast, almost all cognitive psychology and remediation is based on the self-report of what they perceive, think, remember, and feel. That is, they seem to rely on self-reports of what subjects report. This way, emotion is viewed as a product of cognitive construction such that the factors that differentiate the emotions are the cognitive attributions that people make about their emotions.

In last decade, neuroscience studies have reaffirmed the unconscious mind. This technique is based on the unconscious mind for cognitive and emotional diagnosis and treatment. For instance, people can recognize an image they have seen before even when they have been unaware of having seen it²¹. About 40 ms is the time it takes to form an opinion of a stranger, which is a shorter time than a blink. However, it is enough time to observe what the subject's face and body language is doing such that the brain-mind can interpret it unconsciously if its facial features and body language inspire confidence or danger³⁶.

A step further is to focus on cognitively unsound uses of reasoning. We base decisions on the availability of justificatory reasons⁴²⁻⁴³. Conscious reasoning is applied to rationalize more than anything else⁵⁹. This process is supported by neuroimaging studies. One of them²³ concludes that the brain might cheat when learning or behaving, building memorized answers to respond to similar questions. Thoughts and impulses simply arise in consciousness without will or intent. Which is all to say, we are not in any relevant sense the conscious authors of our mental lives, nor the actions that flow from them. Therefore, the self-verbal report is questionable. Another example, the verbally reported strategy to perform a task may not be the one the child used, according to the observable eye movements of the child^{1,6-8,14-15}. Likewise, a self-verbal-report of positive view (overconfidence) of oneself is not necessarily a reliable indicator of self-confidence; on the contrary, it could be the opposite^{7,14-15}. Humans reason rather poorly, as reported by Mercier and Sperber (2011)⁴³, irrational biases in decision making^{37,39-40}. It is about intuitive-unconscious inference⁴²⁻⁴³. This is in sharp contrast to the classical view that pro and con reasoning is the most reliable way to arrive at sound decisions^{17-19,40,58,59}.

Following Kahneman^{37,39-40,60-61}, we have a dual-process system of decision-making: automatic linked to emotion (gut reaction) and deliberative linked to rational calculation. However, following Greene⁶²⁻⁶³, "the response to footbridge has an emotional charge that is missing in the allegedly more rational response to switch." Brain imaging studies link the emotional ventromedial prefrontal cortex with "footbridge" decision whereas the "switch-type" response is linked with the cognitive-rational dorsolateral prefrontal cortex. On the other hand, injury studies of the ventromedial prefrontal cortex show that this injury predisposes approval of

pushing the fat man off the bridge. The LeDoux studies¹³ showed that the temporal amygdala responses to danger before the cortex (thinking brain). More importantly, the response of the cortex did not modify the earlier response of the amygdala. This fact is entirely consistent with the thinking cortex, putting into action thoughts that justify the response to danger (cognitive bias).

To go one step further, we must elaborate on the anticipatory unconscious processing. This processing (unconscious before conscious decision processing) has been studied, not only, in the field of neuroscience²²⁻³⁵. Brain studies on the pre-decision period²²⁻³⁵ have found neural activity representing the upcoming choice. As Soon et al. reported (2013)³¹, a decision can be encoded in brain activity of the prefrontal and parietal cortex up to 10 s before it enters awareness.

As previously reported for practical applications⁷, techniques that are used in this type of communication include the use of metaphors, indirect questions, hypothetical phrases, introductory phrases, ambiguous terms, saturation of channels of information, melodramatic expression or confusion, post-trance amnesia, silence, dissociation, paradox, false alternative options, and prescription of the symptom. These communicative techniques involve extreme attention focalization (trance state) on what is being said and done by the therapist. Attention cannot be focused on other thoughts associated with bad feeling because of the known limited attention span. All this happens unconsciously.

In particular⁶⁴, the metaphor is an indirect method of verbal and nonverbal communication and it is the basis of Ericksonian hypnosis^{44,65}. This method of communication is an educational and psychotherapeutic proven procedure⁴⁵⁻⁵³. The metaphor involves a cognitive effect while conveying an idea - thought (message), but also, and more importantly, produces an analgesic-reassuring effect because of a distraction work linked to focused attention, taking into account that the attention span is limited. In other words, a highly focused attention on getting the meaning of the metaphor in action (Ericksonian hypnosis effect) restricts other cognitive processing (thoughts) and the associated memorized painful feeling (discomfort). It causes an analgesic effect. This analgesic effect is the key to avoid resistance to the communication. If so, interpersonal communication requires to fit this principle to be more effective. On the other hand, there is evidence that the metaphor uses a communication based more on tangible-concrete knowledge rather than abstract knowledge, which makes the message (knowledge) more easily processed and far transferred.

In contrast, most procedures to intervene are based on gaining conscious control of thought and action, but we must assume that implicit emotions are less subject to conscious self-regulation. It is intended to help people learn how to cope with otherwise threatening and debilitating emotional situations, assuming one can strengthen the willpower with practice. Not only does this seem too simplistic, but it sidesteps the core problem of self-control: what is controlling what? The consequence of this is to give cognitive psychology a fuller, richer understanding of how the mind operates. This will inevitably have some implications for clinical work on learning and behavioral disorders and ADHD in particular. The only way to do this is to

get clinicians to collaborate with experimental psychologists to produce methodologically adequate clinical studies.

In conclusion, the Adventures of Fundi was able to improve PASS cognitive processing planning and attention and also achieved remission⁶⁶ in manifestations of ADHD. This result should be attributed to the administration of the whole procedure. It took place using inductive learning and indirect communication (metaphorical Ericksonian hypnosis). Taking into account that the main effect of indirect communication is an effective emotional empathic communication (sensitive effect on self-confidence), we must deduce that other factors, non-cognitive, must be taken into account to maximize the benefit of cognitive and behavioral remediation. Likewise, we must summarize that the critical step within the protocol is the indirect communication, the technique has no significant limitations and its future applications are any dysfunction linked to executive dysfunction.

Some limitations deserve to be highlighted. Further research is required—at behavioral, cognitive, and physiological levels—to delineate the components of goal-directed behavior. The presence of the effect does not actually always provide support for the model. It is still needed to check that individual results hold up. The empirical point is now well established. We caution that the evidence for this proposition is consistent and, in some way, convincing, but maybe inadequately supported by the research so far.

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The authors have nothing to disclose.

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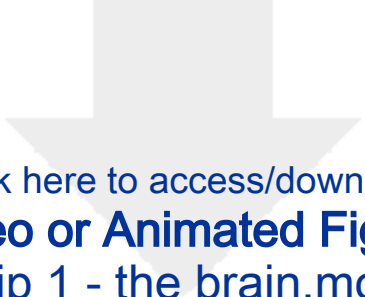
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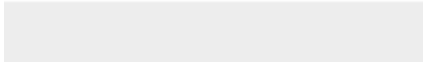

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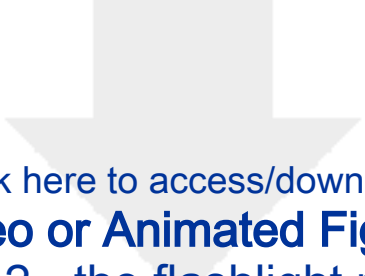
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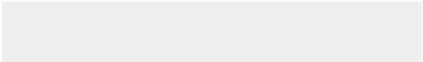



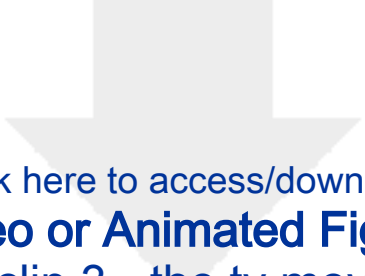
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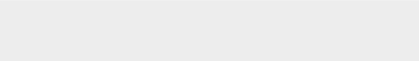
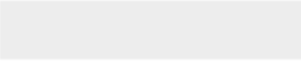



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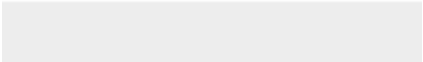



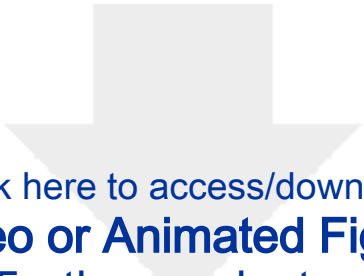
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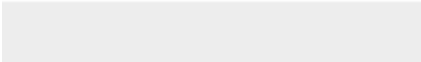



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Comparison of PASS processing before and after remediation

Processing	Mean	SD	t*	p
Planning before remediation	77.76	6.06		
Planning after remediation	80.3	7.43	-18.89	0.000
Simultaneous before remediation	101.48	7.77		
Simultaneous after remediation	102.39	7.9	-1.89	0.064
Attention before remediation	80.26	6.04		
Attention after remediation	91.14	7.01	-13.31	0.000
Successive before remediation	86.21	13.22		
Successive after remediation	86.35	12.78	-0.475	0.636

*Paired-Samples T Test

**Cohen's effect size. trivial (< 0.1), small (0.1–0.3), moderate (0.3–0.5), large difference effect (> 0.5)

*Cohen's d***

2.32

0.23

1.64

0.06

Name of Material/ Equipment	Company	Catalog Number
The Adventures of Fundi	Fundació Carme Vidal Xifre de	---
Computer with internet	Neuropsicopedagogia	---
connection and browser	---	---

Comments/Description

The "Adventures of Fundi" has been designed with the objective of helping to improve the concentration, attention and control of impulsivity for Secondary Education students and it is also possible to apply it to Students in the last cycle of Primary Education. To execute the "Adventures of Fundi" a browser with internet connection is required.

Mozilla, Firefox, Chrome or Safari

ADHD And Fundi'S Adventures Intervention Based on The Cognitive and Emotional Processing

Dear editor,

We assume that criticism does not have the goal of discomforting us or denigrating our work. In fact, we think most referees are impartial in their assessment of papers submitted to them, and too busy to spend time and effort inventing trivial objections to our paper. Then, we proceed to answer.

Editorial comments:

Line 109-112 We can't see the reason for "This part can be removed." In fact, these lines convey the essence of the success of the procedure (Fundis adventures), that is, inductive learning + indirect communication, particularly, Ericksonian hypnosis with the use of metaphor.

Line 167 Reference in the text has been corrected. Consequently, the reference list has been also corrected.

Lines 292-295 and following have been reworded. Lines 398-408 are a list of body expressions . We only have the option to change the successive order of them.

Introduction:

The overall goal of this method, the rationale of this technique, the advantages over alternative techniques have been revised.

Discussion:

We have reduced it significantly. Critical steps within the protocol, limitations, the significance with respect to existing methods, and future applications are all taken into account.

Reviewers' comments:

Reviewer # 1

English Language has been revised again. Proof-Reading has been carried out by two independent entities.

1. Discussion has been significantly reduced.

Reviewer # 2

Major Concerns:

1. The Introduction and Discussion have been revised. The Discussion has been significantly reduced. It is stated that they are "non-systematized and confused without theoretical connections between decision making, implicit learning, emotions, mediation, inductive learning, indirect communication and Ericksonian hypnosis. We are deeply confused because our ability to communicate the concepts we communicate does not seem what we would like. Maybe one of the reasons is the originality of the paper.

The Introduction and Discussion have been re-written. We have considered shortening and modifying them accordingly to the criticism put forward. The introduction and discussion are structured in successive paragraphs that explain the basic concepts that support the technique. We pull the threads of our argument together in logical form in the introduction and discussion. Other experienced scientists from our environment have examined the structure of the paper for

logical flow. We have obtained a critical review from experienced colleagues who are doing similar work, but who has not been involved in preparing the manuscript. The introduction indicates the aim and scope of the paper. It states the purpose in undertaking the work. It explains how our investigation moves forward.

2. We have re-written our concepts.

3. This article does not focus on analyzing ADHD but on the effectiveness of a technique applied to a sample of ADHD without comorbidity diagnosed using DSM criteria.

4. We have endeavored to clarify concepts of the remedial therapy. The go/no go task is considered a good task to investigate implicit decision-making. It is mentioned in the introduction.

5. The participants were recruited from among those who come to the Fundació Carme Vidal de NeuroPsicoPedagogia for remedial therapy.

6. Experimental design is described. A random, prospective, longitudinal, uncontrolled, analytical study (before – after) was designed.

7. Results: lines 335-345 have been moved from results to participants.

8. The suggestion of the references by Fabio et al. is appreciated, but we are afraid that these articles do not fit our paradigm. This suggestion may be the consequence of not having been able to clearly communicate the concepts that support our model. We can measure emotion objectively, in terms of behavioral and physiological changes, and more importantly, behavioral and physiological changes are dissociable, to some extent, from self-verbal reported emotional states. We are providing the rationale for a program of research on dissociations between conscious and unconscious emotional life.

Reviewer # 4

Introduction:

It is "too short about ADHD." We must argue that the article does not focus on analyzing ADHD but rather analyzing the efficacy of a novel technique in an ADHD sample without comorbidity according to DSM criteria.

It is said that "enough information about clinical diagnosis regarding ADHD." Sincerely, diagnosis of ADHD according to DSM is a standard procedure. In "Recruitment of subjects" we have complemented it with "ask a psychiatrist."

The reviewer "is very surprised that the sample would not have psychiatric disorder or any previous medication or any other therapy". Indeed, comorbidity is soaring, but our center receives a huge number of visits per year because of TDAD. This makes it relatively easy for us to select a sample of these characteristics. On the other hand, our center has an excellent reputation for which it is quite common for patients to come without going through other professionals.

A possible ethical problem is raised due to non-multimodal treatment for 6 months. Indeed, the participants went 6 months without multimodal treatment, but not without treatment, although in the absence of sufficient previous scientific evidence. However, there was informed consent that allowed the study to be abandoned at any time and the study was maintained because the relatives and we observed a good response and improvement in ADHD.

The impact of the procedure in terms of results is questioned. Indeed, we ourselves were surprised by the results. We must clarify that our procedure cannot be defined as "cognitive remediation training." Precisely, the originality of the procedure used is that it is emotional rather than cognitive remedial training. The results obtained are a powerful reason to do other similar studies to confirm or not the results.

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