Journal of Parapsychology
2020, Vol. 84, No. 2, 276-286

http://doi.org/10.30891/jopar.2020.02.08

Dissonance, Complementarity, and Psi[1]

Ian Tierney

University of Edinburgh

Abstract: Complementarity, involving contradictory or incompatible observations necessary for a full description, is essential to the concept of entanglement in quantum theory. Both terms have recently been used, analogously, in three somewhat similar theories relevant to the subject matter of parapsychological research, Generalized Quantum Theory, the Model of Pragmatic Information, and Dual-Aspect Monism. I propose that phenomenologically the cognitive/emotional experience of *dissonance* may be a consequence of consciously acknowledged complementarity. Dissonance may be a necessary component of psi, particularly psychokinesis. Reduction of dissonance may account for a number of the replication difficulties reported in the parapsychological literature. These are, total failure to replicate a significant result, partial confirmation with or without position effects, reciprocity of effect strength/reliability, and experimenter effect whereby significant results are reported by some experimenters but not by others. I describe a research design that could elucidate the role of dissonance in obtaining significant evidence for psi.
Keywords: Dissonance, complementarity, psi

What has been described by Kennedy (2003) as "the capricious, actively evasive, unsustainable nature of psi" is evidenced in parapsychological research by failures in replication, either complete or partial. Effects such as non-replication of statistically significant results, supposed serial order decline or incline of significant results, displacement effects within and between trials, reciprocity of effect size/reliability, and possible experimenter effects, have all been cited as exemplifying Kennedy's description. An explanation (other than the obvious skeptical one) which could encompass these varied patterns of results is overdue.

In this paper I propose that *dissonance* describes the phenomenological experience of complementarity, a term used in quantum theory to denote a state of incompatibility between some observables, all of which are necessary to fully describe an event or state. In the context of parapsychological research, the state of dissonance may result from attempts to accommodate contradictory or incompatible cognitive schema including incompatible anticipations of outcome. The experience of dissonance by experimenters and/or participants may be positively correlated, or possibly necessary, to significant results in psi, particularly psychokinesis, experiments. Furthermore, variations in dissonance may de-

1 The author is grateful to an anonymous reviewer for this journal who made very significant and comprehensive suggestions about an original version of this paper, and to colleagues Peter Lamont and Caroline Watt for their critical comments and suggestions on early drafts of this paper. Address correspondence to: Correspondence: Dr. Ian Tierney, Honorary Research Fellow, Koestler Parapsychology Unit, Psychology-PPLS, University of Edinburgh. 7 George Square, Edinburgh EH8 9JZ, UK, iantierney50@gmail.com

scribe most, and possibly all, of the effects described by Kennedy. These contentions are based on three independent lines of reasoning, stemming from three recent theoretical conjectures, an empirical observation and several experimental results.

First - complementarity, which has been part of a number of recent theories in parapsychology, is essential to entanglement which is employed in the description of psi or synchronicity as 'non- local entanglement correlations' (Lucadou, Römer, & Walach, 2007). It is possible that a phenomenological description of the quantum theory concept of complementarity might lead to insights for designing more informative parapsychological experiments. Houtkooper, describing the history of Bell's Inequality notes that "an issue which at first had to do with the understanding of the theory and how to paint a satisfactory mental picture of it became an experimental issue" (Houtkooper, 2002, p. 175).

Second, analysis of a large collection of spontaneous anomalous (or extraordinary) experiences (Fach, 2011: 1649 individuals) suggest that complementarity is an element that occurs very frequently in the descriptions given by experients.

Third, in the context of general psychology, dissonance is the result of experiencing contradictory beliefs or information. It is often experienced as to some degree aversive, producing psychological discomfort or stress. This usually results in avoidance behavior, specifically cognitive changes which reduce the contradictions (Festinger, 1957), so dissonance is usually a short-lived experience. Reflecting on the origin and fate of dissonance as experienced by both experimenters and participants in parapsychological experiments reveals many similarities with the observed effects or patterns which were the bases of Kennedy's observations.

Complementarity in parapsychological theory and experiment

Lucadou et al., (2007) suggested that synchronistic or psi phenomena can be interpreted as entanglement correlations using the formalism introduced by Weak or Generalized Quantum Theory (GQT: Atmanspacher et al., 2002) and that complementarity is necessary for entanglement. The GQT argument is that it is possible to define certain quantum theory terms such as 'complementarity and entanglement' in generalized ways. The "weak version of the theory is still mathematically formulated, but no longer restricted to physics in its traditional scope" (Atmanspacher et al., 2002, p. 380). These authors have proposed that this formulation "could be explored in philosophical, psychological or psychophysical problem areas" (p. 380). Complementarity or "the non-commutativity or incompatibility of observables is at the heart of the non-Boolean structure of quantum theory, *and as such it is a major precondition for situations in which states of systems are entangled*" [emphasis added] (Atmanspacher et al., 2002, p. 382). Atmanspacher (2014, p. 182) has elsewhere noted that "as is well known in mathematics, representations of non-Boolean systems are generally incompatible, and complementarity can be formally characterized as a maximal form of incompatibility". In GQT, complementarity also reflects Niels Bohr's 1948 use of the term where "complementary features typically exclude one another, but at the same time complement each other mutually to give a complete view of the phenomenon under study" (Atmanspacher et al., 2002, p. 381).

The contexts in which the term complementarity can be used legitimately, particularly in GQT

discussions as opposed to more accepted usage of this term, has been examined by Hinterberger and Stillfried (2013). These authors have cautioned against the act of associating the term complementarity with a variety of dualistic phenomena, by analogy and/or metaphor, suggesting that this "is often done without enough consideration of the essential differences between them" (Hinterberger & Stillfried, 2013, p. 452). Never-the-less, they have suggested that the "complementarity between local and global observations might be a very generic complementarity .....It is thus the contrast of potentiality versus actuality, or the probabilistic and factual description of the world" (Hinterberger & Stillfried, 2013, p. 451).

For example, in psychokinesis experiments the local expectation/anticipation of producing a highly unlikely event (versus a skeptical general, global, anticipation) would constitute complementarity. As an illustration, this is the assumption implicit in some recent psychokinesis experiments using the Correlation Matrix Method (CMM: Lucadou et al., 2007; Lucadou, 2015a). In the CMM participants are asked to influence the output of a random number generator (RNG) represented as a 'growing' fractal target, using intention alone. They indicate their intention, growth to right or left, using key presses. A correlation matrix for each experiment is constructed using variables from the participant's intention behavior (frequency and timing of key presses) correlated with mean and variance measures of the RNG output. Several experiments (Lucadou, 2015a; Flores et al., 2018; Lucadou, 2019; Walach et al., 2020) have found a greater-than-expected number of significant correlations in these correlation matrices. Permutation tests are usually employed as control procedures in these experiments where these 'excess' significant correlations are cited as evidence for psi or synchronicity and are believed to be a-causal non-local entanglement correlations. These correlations occur even in parts of the matrices where it is difficult to identify causal origin (present target events correlate with future intention, time-displaced correlations). However, caution in interpreting these results has been introduced by the suggestion that, to an as yet undetermined degree, some of these excess correlations are artefacts produced by speed of response on the indicative key presses interacting with diode heating in the RNG where key presses initiate a trial but are otherwise not connected to the RNG. This possibility has been reported recently in one data set from one experiment (H. Grote, personal communication, August 19, 2019). Removing these correlations, which were assumed to be causal in origin, resulted in a statistically non-significant outcome.

Nevertheless, these CMM experiments serve as examples of parapsychological research where the use the terms 'a-causal', 'non-local' and 'entanglement' derived from quantum theory is central to the argument. While Walach et al., (2020) say explicitly that "we use quantum entanglement correlations as an analogy" they continue:

> we assume that it is likely that these correlations are all we have and no further underlying signal will be discovered, and such correlations are instigated by the general systemic arrangement and might be ontologically final in the sense that there is no underlying deeper causal structure to be discovered. (p. 174)

A theory that shares many of the elements of GQT is Lucadou's (1995, 2015b) Model of Pragmatic Information (MPI). In the MPI the eponymous pragmatic information or meaning in the system, is the product of two complementary states, 'novelty' and 'confirmation' (Lucadou, 2015b, pp. 3-4).

The observed anomalous events, psi or non-local entanglement correlations, such as those reported in experiments using the CMM, occur when this condition of complementarity exists in the experimental environment. The MPI differs from the GQT primarily in the introduction of a non-transmission (NT) axiom. This is seen as being the inevitable consequence of using quantum theoretical constructs and, importantly, as an explanation for Kennedy's 'evasive and unsustainable nature of psi'. Lucadou (2015b) suggests that poor replicability, decline effects, and the inverse relation between effect size and its reliability all arise because experiments implicitly assume that effects are causal (or signal-based). Normally, in standard research into cause, a significant result would contain informational properties: most importantly the idea that predictions can be made – that the causal chain is understood. Lucadou believes this is not the case in psi phenomena where acting on such an understanding axiomatically destroys the correlation. The NT-axiom states that:

> any attempt to use a non-local correlation as a signal transfer makes the non-local correlation vanish or changes the effect in an unpredictable way (e.g. the effect may show up in a different variable which was not in consideration beforehand), known as 'displacement-effect'. (Lucadou, 2015b, p. 7)

However, it is not clear on what grounds this axiom is justified, other than it addresses, *post hoc* without experimental support, some observed effects in parapsychological research, and is required in formal, as opposed to generalized, quantum theory.

The NT-Axiom is seen by Lucadou as relevant to many anecdotal reports throughout the history of parapsychological research that more significant results are obtained at the inception of a research program (Rhine, 1935; Dunne et al., 1994; Kennedy, 2003; Grote, 2017 p. 7 [footnote]). Results of subsequent attempts to replicate these findings sometimes demonstrate either failure to replicate at all, variable replication success or putative series position effects (Dunne, et al., 1994: The PEAR studies; Haraldsson & Houtkooper,1995; Storm, Tressoldi, & DiRisio , 2010; Baptista et al., 2015; Lucadou, 2016). However, the evidence for serial position effects, such as those reported in the PEAR studies, may be confounded by the employment of very rare 'gifted' participants at different points in the series resulting in artefactual patterns which may not reflect a general effect. Whatever the proportions of these patterns, or indeed whether there is reliable evidence for series position effects at all, it is unclear by definition how, logically, an absolute NT- axiom could effect a gradual rather than complete decline, or how 'displacement', the alternate outcome claimed for the axiom, could produce any sustained pattern of results.

Another theoretical formulation related to anomalous events such as psi and involving complementarity is the Pauli-Jung conjecture (Atmanspacher, 2012; 2014). In this formulation - dual-aspect monism - "mind and matter appear as complementary aspects: they are mutually incompatible but both together necessary to describe mind-matter systems exhaustively" (Atmanspacher, 2014, p. 182). This reflects the radically holistic position that mental and physical aspects emerge from an undifferentiated state (Jung's *unus mundus*) by a decomposition of the whole rather than a composition of elements. Atmanspacher added to this deeply metaphysical position by suggesting that there are two types of psychophysical correlations, structural and induced, which result from this decomposition. Structural psychophysical correlations are predictable, uni-directional in time, ubiquitous, persistent and empiri-

cally reproducible (Atmanspacher, 2014, p. 190). Atmanspacher noted that rather than the term synchronicity employed by Jung in relation to these events, Pauli preferred "meaningful correspondences" under the influence of archetypal "a-causal ordering".

The second type of correlation - induced psychophysical correlations - "refer to the back-reaction that changes of consciousness induced in the unconscious and, indirectly, in the physical world as well" (Atmanspacher, 2014, p. 190). This reflexive or temporally bi-directional effect "depends on all kind of contexts (e.g. personal situation, environment). They occur occasionally, are evasive and not easily reproducible." (Atmanspacher, 2014, p. 190). These induced psychophysical correlations have the elusive capricious properties Kennedy describes and sound very similar indeed to the non-local entanglement correlations described by Lucadou et al., (2007) and for which complementarity is a necessary condition. Furthermore, the description of the 'contexts' is very reminiscent of Lucadou's use of the term *organizational closure* in the MPI (Lucadou, 1995/2015; Tierney et al., 2018) which describe some conditions which elsewhere in the parapsychological literature are considered psi-conducive (Delanoy, 1997).

Finally, in a clinical setting Fach (2011) has presented empirical evidence that in a large sample (1649 cases) of spontaneous anomalous (or exceptional) experiences outside of the laboratory setting complementarity is often evident in the experient's description. He has cited several possible complementary features: "these include, among others, conscious/unconscious, repression/projection, external/internal, autonomy/reliability, control/trust, and novelty/confirmation" (Fach, 2011, p. 242). Although Fach describes anomalies of both a self-model and a world model associated with different types of anomalous experience, in externalized events such as poltergeist (possible PK) phenomena it is the latter that applies: "for individuals experiencing such anomalies, their exceptional character is due to a subjectively perceived violation of the principles of cause and effect, i.e., the absence of a conventional explanation "(Fach, 2011, p. 236). Translating this into the experience of a participant in a PK experiment, it is the incongruity and incompatibility of possible outcomes that illustrate complementarity. In Fach's terms, derived from Lucadou's MPI (1995, 2015b), this experience implicates complementary states e.g. 'novelty/confirmation' and possibly 'autonomy/reliability'.

Differences between Knowledge by Acquaintance and by Description

Differences between 'knowledge by acquaintance' and 'knowledge by description' (Russell, 1910) are another way to approach the experience of complementarity. These two types of knowledge are usually congruent, but where they are in contradiction, they may affect the observer in different ways. Usually knowledge by acquaintance tends to contain more emotion (because it has been experienced personally previously) whereas knowledge by description tends to generate more dispassionate cognitive expectations. Anticipating unlikely outcomes, as a result of previous personal experience, while knowing the consensus view of their probability, sets up a conflict while at the same time make tolerating that conflict more difficult.

For example, in attempting to influence a physical system solely by volition alone (psychokinesis: PK) the participant in such experiments is required to consider various possible complementary outcomes as the experiment progresses. In an initial PK experiment the local observables, before feedback of results, are the experimental requirements, both physical and psychological. The global observations

are the consensus view on how the world 'works'; and positive outcomes from PK experiments are unlikely to be the considered consensus view. However, by the nature of the enquiry, there must be some different expectation in the parapsychological researcher, and possibly in the participant, that the results of the initial experiment might contradict the consensus. In further experiments feedback from the first experiment affects their anticipation of subsequent results.

Dissonance

My central contention in this paper is that dissonance (Festinger, 1957; Bem, 1967) is the cognitive and emotional experience of consciously acknowledged complementarity and is necessarily involved in anomalous experiences such as psychokinesis. Whether it is a sufficient condition remains to be seen. Dissonance is a disquiet generated by trying to accommodate conflicting observables. This state, which was first described by Socrates as *thaumazein* has been translated as 'bewilderment provoked by seemingly impossible contradictions' (Lamont, 2017, p. 2). Tellingly, Descartes held a negative view of this state: "Although it is good to be born with some kind of inclination to this passion because it disposes us to the acquisition of sciences, yet we ought afterwards to endeavor as much as we can to be rid of it." (Descartes, 1989, p. 52).

The degree to which the dissonance is maintained or, with time and feedback, is usually reduced, defines a commutator presently missing from descriptions such as the GQT and the MPI - in mathematics the commutator gives an indication of the extent to which certain binary operations fail to be commutative. Dissonance is typically short-lived as it usually results in avoidance behavior - specifically cognitive changes which reduces the degree to which the observables are complementary – non-commutative. As a result of this reduction the observables then become more commutative; anomalous events (putative non-local entanglement correlations) are reduced; results then conform increasingly to global expectations, resulting in non-replication or series position effects. This directionality, where dissonance is reduced to cope with disquiet by favoring the dominant global observation is most often the case, as, going in the other direction, favoring the local observation, is increasingly hard to sustain against the 'weight' of the consensus global observation. However, in situations where the initial studies, for whatever reasons, are particularly convincing (c.f. Batcheldor, 1984, Lucadou, 2015a) it may be possible to tolerate the dissonance engendered by complementary local and global observations for some time and over several studies, leading to an incline or at least an asymptotic effect on the statistical significance of results.

Tolerating dissonance should sustain the anomalous events, but this requires the experimenter to effectively encourage the participant (and themselves) into a state where she/he can maintain dissonance. Without this the dissonance is likely to collapse in favor of the consensus. The reciprocity of effect size and reliability illustrates this. The higher the 'amazement' factor, the starker is the contrast with the consensus, therefore the greater the dissonance that must be sustained to maintain the experience. Dissonance produced by two incompatible global observations, both knowledge by description, such as occurs in a naïve subject or experimenter, is likely to involve expectations with less emotion invested, because neither of the observations relies on personal experience, and therefore the state of dissonance is more readily tolerated. This may permit the original hypothesis, however unlikely, to

be evidenced in the early pattern of significant non-local entanglement correlations associated with complementary observables. Thereafter the person is no longer naïve but must accommodate their previous results/experience as local observables. It is possible, however, that novel changes to the parameters of the experiment may 'reset' the conditions for dissonance, but only where the changes are indeed novel in the participant's experience.

Manipulating Dissonance

Measuring or otherwise manipulating dissonance should be lawfully correlated with outcome. Reduced dissonance in favor of the consensus should be negatively correlated with effect size in parapsychological experiments. As an example of an experimental design which could test this: two groups of subjects, differentiated by the 'openness to experience' personality factor (in the NEO formulation: Costa & McRae, 1992) are each split again such that half of each group is exposed to either a pro- or anti-psi propaganda video clip before asking all subjects to undertake a psi-task (Jolij, Bierman, and Lobach have recently piloted this procedure, albeit for different reasons). The prediction from a dissonance model would be that the 'low openness/anti-psi clip' group would produce less significant evidence of psi than would the 'high openness/pro-psi clip' group. The first group are likely to experience low to very low dissonance. The second group, comprised of individuals who while being open to, and positively anticipating the anomalous events, are as equally aware as the first group of the consensus global view on the probability of psi, so have to accommodate higher levels of dissonance. In principle it is difficult to predict which characteristics are likely to maximize dissonance, and indeed it is probable that many different combinations of characteristics will produce this state. One ideal candidate would be someone with relatively set views on the existence of psi who is also willing to consider seriously, and be affected by, the counter evidence.

The dissonance element should not be confused with belief or disbelief in psi as addressed in the parapsychological sheep/goat literature (Schmeidler, 1945). Belief is not synonymous with anticipation of results which change continuously depending on feedback. Belief is a much more long-term state dependent on many and varied variables, many unrelated to feedback. Scales which assess belief in the paranormal either measure, in some or most of the items, the participant's agreement with general statements about the paranormal (Tobacyck, 2004: The Revised Paranormal Belief Scale: 25/26 items) or also include items reflecting the participant's personal anomalous experience (Thalbourne, 2010: The Australian Sheep/Goat Scale: 13/26 items). There is presently no measure of disquiet/dissonance experienced due to incompatibility between knowledge by experience and knowledge by description. For reasons discussed above such disquiet/dissonance is not static but may be altered by feedback, so is unlikely to be measurable by relatively inflexible, lengthy, scales. Possibly a simple Likert scale indication of such disquiet at times during an experimental session might suffice.

Experimenter Effect

While concepts like the NT-axiom or induced correlations in dual-aspect monism may address non-replication and possible serial position effects, this is not the case for the experimenter effect. This is the observation that some experimenters are consistently more successful than others in obtaining significant results in psi experiments (Kennedy & Taddonio 1976; Wiseman & Schlitz, 1997; Parker &

Millar, 2014). There does not appear to be any relevant aspects of the previously mentioned theories that address this. Even assuming that some of these patterns are due to methodological and reporting errors (Kennedy, 2014; Bierman et al., 2015) this effect, often talked about as 'the elephant in the room', requires an explanation. Here dissonance may provide such an explanation because there are likely to be experimenter-specific differences between experimenters in their ability to sustain their own and their participants' dissonance.

Conclusion

Some mechanism such as the NT-axiom from the MPI or the reflexive nature of induced psychophysical correlations in dual-aspect monism *is* required to account for some effects observed in parapsychological research – i.e. non-replication, reciprocity of effect size/reliability, possible serial order effects and experimenter effect. If complementarity is a necessary condition for the occurrence of psi, as suggested in the theories discussed, can this state be described in phenomenological terms? I suggest that the experience of conflicting incompatible observations/anticipations, characterized as 'dissonance', describes a state which is necessary for the occurrence of anomalous psychophysical events such as psychokinesis. Furthermore, when compared with the NT-Axiom the dissonance model accommodates more of the observed difficulties in replicating statistically significant results. The dissonance proposition is testable. Measures or manipulation of dissonance prior to initial parapsychological experiments, and subsequently prior to replications, should vary lawfully with effect size. If reduction of dissonance accounts for all the effects which contribute to Kennedy's (2003) "capricious, actively evasive, unsustainable nature of psi", then the terms complementarity and entanglement may have more heuristic value than their present analogical use in parapsychological discussions.

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Dissonance, Complémentarité, et Psi

Résumé : La complémentarité, impliquant les observations contradictoires ou incompatibles qui sont nécessaires pour une description complète, est essentielle dans la conception de l'intrication dans la théorie quantique. Ces deux termes ont récemment été employés, de façon analogique, dans trois théories similaires relatives à la recherche parapsychologie : la Théorie quantique généralisée, le Modèle de l'information pragmatique et le Monisme à double-aspect. Je propose que, phénoménologiquement, l'expérience cognitive/émotionnelle de la *dissonance* pourrait être une conséquence d'une complémentarité consciemment reconnue. La dissonance pourrait être un composant nécessaire du psi, en particulier dans la psychokinèse. La réduction de la dissonance pourrait rendre compte d'un certain nombre de difficultés de réplication reportées dans la littérature parapsychologique, dont l'insuccès total dans la réplication d'un résultat significatif, la confirmation partielle avec ou sans effets de position, la réciprocité de la force et de la fiabilité de l'effet, l'effet expérimentateur où les résultats significatifs sont rapportés par certains expérimentateurs et non par d'autres. Un protocole de recherche est esquissé afin d'investiguer le rôle potentiel de la dissonance dans l'obtention de preuves significatives du psi.

Dissonanz, Komplementarität, und Psi

Zusammenfassung: Komplementarität, d.h. widersprüchliche oder inkompatible Beobachtungen, die für eine vollständige Beschreibung notwendig sind, ist für das Konzept der Verschränkung in der Quantentheorie von wesentlicher Bedeutung. Beide Begriffe wurden in jüngster Zeit analog in drei sich ähnelnden Theorien verwendet, die für den Gegenstandsbereich der parapsychologischen Forschung relevant sind, nämlich in der Verallgemeinerten Quantentheorie, dem Modell der Pragmatischen Information und dem Duale-Aspekte-Monismus. Ich schlage vor, dass die kognitiv-emotionale Erfahrung von *Dissonanz* phänomenologisch eine Folge der bewusst wahrgenommenen Komplementarität sein kann. Dissonanz kann ein notwendiger Bestandteil von Psi sein, insbesondere der Psychokinese. Die Reduktion der Dissonanz kann für eine Reihe von Replikationsschwierigkeiten verantwortlich sein, über die in der parapsychologischen Literatur berichtet wird. Diese sind: völliger Fehlschlag bei der Replika-

tion eines signifikanten Ergebnisses, teilweise Bestätigung mit oder ohne Positionseffekte, Reziprozität von Effektstärke/Reliabilität und der Experimentatoreffekt, bei dem signifikante Ergebnisse von einigen Experimentatoren berichtet werden, von anderen jedoch nicht. Es wird ein Forschungsdesign skizziert, das die Rolle von Dissonanz zur Erzielung signifikanter Evidenz für Psi prüfen könnte.

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Resumen: La complementariedad, que implica observaciones contradictorias o incompatibles necesarias para una descripción completa, es esencial para el concepto de entrelazamiento (entanglement) en la teoría cuántica. Ambos términos se han utilizado recientemente, de manera análoga, en tres teorías algo similares relevantes al tema de la investigación parapsicológica: la Teoría Cuántica Generalizada, el Modelo de Información Pragmática, y el Monismo de Doble Aspecto. Propongo que fenomenológicamente la experiencia cognitiva/emocional de disonancia puede ser una consecuencia de la complementariedad reconocida conscientemente. La disonancia puede ser un componente necesario de psi, particularmente la psicoquinesis. La reducción de la disonancia puede explicar varias de las dificultades de replicación reportadas en la literatura parapsicológica incluyendo: falla total para replicar un resultado significativo, confirmación parcial con o sin efectos de posición, reciprocidad de fuerza de efecto/fiabilidad, y efecto del experimentador, en el que algunos experimentadores informan resultados significativos y otros no. Describo un diseño de investigación que podría dilucidar el papel de la disonancia en la obtención de evidencia significativa para la psi.