

Observation of Maternal Affect Attunement Behavior
during the Strange Situation Procedure

By:

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AN HONORS THESIS

for the

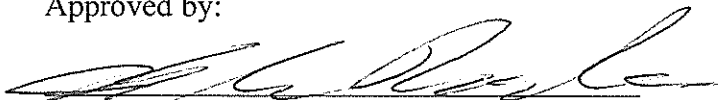
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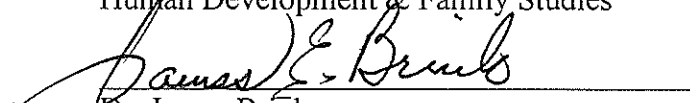
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Observation of Maternal Affect Attunement Behavior during the Strange Situation Procedure

Honors Thesis

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Introduction

Daniel Stern advanced the concept of “affect attunement” in the mid 1980’s (Stern, Hofer, Haft, & Dore, 1985). While mothers, fathers, and even strangers exhibit affect attunements to children, mothers are likely to demonstrate such behaviors at the highest levels (Chada, 1995). According to Stern, mothers are often motivated to understand and resonate with their infants’ feelings and desires and engage in behaviors that he termed as “affect attunement” (Stern et al., 1985). Stern distinguishes such maternal behaviors from mere “copying” or “mimicking” because affect attunement behaviors often differ in modality and are done unconsciously while matching the intensity (Stern et al., 1985). In other words, mothers may try to provide vocal support for their babies when exhibiting certain behaviors or some kind of physical representation with gestures when their babies vocalize with the same intensity. In most cases, the mother does this unconsciously, and in a different form than that expressed by the child (e.g., a mother making drum sounds to her child banging) (Stern et al., 1985). These interactions can be extremely subtle for both mother and child but are still meaningful interactions (Reddy, Hay, Murray, & Trevarthen, 1997). That is because through such subtle interactions, the child could perhaps sense the on-going confirmation of being cared for and understood.

It is the intermodality of affect attunement that elaborates these shared feeling states the mother is experiencing with her infant (Jonsson, Clinton, Fahrman, Mazzaglia, Novak, & Sorhus, 2001). A mother internalizes her infant’s inner feelings and relays these feelings back to the infant using verbal and/or nonverbal signals. Stern et al. (1985) claim that the best way to describe affect attunement phenomena is through examples, as presented in the following example(s):

Example 1. A 10-month-old girl finally gets a piece in a jigsaw puzzle. She looks toward mother, throws her head up in the air, with an arm flap raising herself partly off the ground in a flurry of exuberance. The mother says “YES, that a girl.” The “YES!” is intoned with much emphasis. It has an explosive rise that echoes the girl’s fling of gesture and posture. One could easily argue that the “YES, that a girl” functions as a routine response in the form of a positive reinforcer. And it certainly does do so. But, why does not the mother just say, “yes, that a girl”? Why does she need to add the intensely intoned “YES...” that vocally matches the child’s gestures? The “YES,” we suggest, is an attunement embedded within a routine response (p. 250-251).

Example 2. An 8 ½-month-old boy reaches for a toy, just beyond reach. Silently, he stretches toward it, leading and extending arms and fingers fully. Still short of the toy, he tenses his body to squeeze out the needed extra inch of reach. At the moment, his mother says, “uuuuuh...uuuuuh!” with a crescendo of vocal effort, the expiration of air pushing against her tense vocal chords. The mother’s accelerating vocal-respiratory effort matched the infant’s accelerating physical effort (p. 250).

These affect attunement behaviors are important particularly in the development of self for the infant. Mothers respond to their infant’s behavior thus leading the infant to feel and have a secure sense of the world and their place in it (Stern et al., 1985). Stern et al. argue that infants may not acknowledge such maternal attuning behaviors but that infants would notice when misattunement occurs. It is predicted that infants’ frequent experiences of misattunement or non-attunement may lead to a less optimal developmental outcome or even pathology. Stern and colleagues define behaviors of misattunement as “the allusion of sharing, but not the actual sense of sharing” (Stern et al., 1985). A misattunement occurs when the mother misjudges her infant’s

inner state, and sometimes includes interruption of child's play (Stern et al., 1985). An example of misattunement that Stern et al. provides is as follows:

A little boy crawls away from mother to a new toy, and then begins to flail the toy about once he grabs it. His play is very animated through his motions, vocalizations and breathing. The mother pretends to not understand the level of the infant's excitement, and jiggles his bottom from side to side with less enthusiasm and intensity. The baby then stops his play, and turns to look at the mother, noticing that her action did not match his intensity (p. 261-262).

In sum, affect attunement exchanges are generally considered to be a positive sharing experience for mother and child. However, these exchanges can also be negative if mismatched (Osofosky, 1987). Affect attunement is thought to play a very important role in the socialization process that may be essential to the infant's development of a sense of self (Stern et al., 1985). These behaviors may represent a pertinent part of intersubjective relatedness, because to complete affect attunement behaviors, the mother needs to respond to the child without merely imitating the child's action (Stern et al., 1985).

Many have argued that the mother-child relationship is a dyadic interaction where both parties are participants and that in turn leads to the development of a bond between them. Such interactions then could later affect the quality of the attachment of the infant to the mother/caregiver (Crittenden, 1997; Emde, 1980; Sander, 1984; Stern, 1985; van den Boom, 1997). However, studies that examine associations between affect attunement phenomena and attachment are rare and the findings based on a few studies, often with extremely small sample sizes, have shown inconsistent results (Haft, 1989; Haft & Slade, 1989; Szajnberg, Skrinjaric, & Moore, 1989).

In 1978, Ainsworth and colleagues (Ainsworth, Blehar, Waters, & Wall, 1978) developed the seminal laboratory procedure known as the Strange Situation Procedure (SSP). The SSP is a laboratory procedure designed to identify the attachment behavior during instances of increasing stress to the infant. The SSP is a widely used gold standard measure of attachment that consists of eight episodes in which the mother and child interact and includes two separations and two reunions. Episode 1 is a brief introductory episode where the mother enters the room, carrying her infant in her arms. The remaining seven episodes last approximately three minutes each. During episode 2, the infant explores a heap of toys on the floor with the mother present. She takes a seat but responds to the infant as necessary. During episode 3, a stranger enters, and the infant and stranger interact with the mother present. Episode 4 is the first separation when the mother leaves the room and the stranger remains in the room. Episode 5 begins when the mother returns to the room and the first reunion between mother and child occurs. During episode 6, the mother separates from the child again, leaving the infant alone in the room for a second separation. During episode 7, a stranger enters but separation from the mother continues. Episode 8 is the final and second reunion episode when the mother returns.

Thus, in the SSP, episodes 3, 4, 6, and 7 do not include the mother interacting with the child. Nevertheless, the SSP presents a series of contexts, varying in the degree of stressfulness for the child, and thus, the SSP may offer an optimal situation in which maternal affect attunement behaviors can be observed. The SSP was initially devised to estimate the child's security of attachment toward the caregiver based on their interactive behaviors displayed during reunion episodes. However, discussion of the process of assessment as well as attachment categories derived from this assessment is beyond the scope of this paper, thus is not further discussed.

The Present Study

In this study, maternal response behaviors during the SSP were observed. Specifically, the present study seeks to systematically observe and evaluate maternal affect attunement behaviors that are exhibited during the episodes when mothers are present and available to interact with their infants. The SSP was thought to provide the ideal environment in which maternal affect attunement behaviors can be observed because mothers were given no specific instruction on how to behave toward their infant, thus, mothers' spontaneous attunement behaviors can be examined.

To the best of my knowledge, Stern's notion of affect attunement has not gained much attention to be empirically validated. No study to date has systematically investigated this phenomenon. The goal of this study is to; a) develop a new coding scheme to capture affect attunement behaviors, b) examine if indeed affect attunement behaviors can be systematically recorded, and c) to explore whether modality of affect attunement behaviors is mostly cross-modal as Stern et al. (1985) claim. Because Stern basically only provided the descriptive account of affect attunement behaviors, this study attempts to present a framework to systematically record affect attunement phenomena.

Methods

Participants

The current study was conducted based on the archived data made available by Dr. Kazuko Behrens. A subsample of mother-child dyads ($N = 59$) was observed. They were initially recruited as part of a larger, longitudinal social development project. Infants were 12 months old ($M = 53.63$ weeks, $SD = 3.01$), and 30 (51%) were boys. Mothers' age ranged from 20 to 39

years old ($M = 29.34$, $SD = 4.46$). Mothers were primarily White (85%) with the rest including Hispanic (10%) and others (5%).

Procedure

Mothers and their 12 month-old children visited Behrens' lab at Texas Tech University and participated in the standard Strange Situation Procedure (SSP; Ainsworth et al., 1978). As stated earlier, the SSP consists of eight episodes, lasting three minutes each, except for the first brief introductory episode. The SSP includes two mother-child separations and reunions during which infants' interactive behaviors are observed to estimate attachment security. The SSP is a well-validated, gold standard measure of attachment security of infants (e.g., Solomon & George, 2008). In this study, episodes 2, 5 and 8 of SSP were chosen for coding affect attunement. Episode 2 consists of the infant exploring toys with the mother present. Episode 5 is the first reunion episode. Episode 8 is the second reunion episode. The remaining episodes did not include the mother interacting with the child (i.e., Episode 3 of infant-stranger interaction with mother present; Episode 4 of the first separation where the stranger is present; Episode 6 of infant alone for second separation; Episode 7 of continued separation from the mother with the stranger present).

Measures

Affect Attunement. A coding scheme was newly developed for the current project to systematically capture the phenomenon of affect attunement. Following careful review of maternal behaviors in several SSP pilot cases, a decision was made as to what maternal behaviors would constitute affect attunement behaviors. Affect attunement behaviors in the current study are defined as behaviors in which the mother responds to her infant in an effort to understand and identify with her infants' feelings and actions, following Stern et al.'s (1985)

description of the phenomena. For the current study, attunements were coded when the infant initiated an action that the mother then responded to trying to share her infant's inner state. Each attunement was then coded as either cross modal or same modal and judged at one of three levels, as high (3), medium (2), or low (1) on accuracy for intensity matching. After a number of revisions and refinements, the current coding scheme was devised: IIA = infant initiating action; IAD = infant action direction; MRA = mother's responding action; MOR = modality of response; AOR = accuracy of response (See Appendix).

Coding

Each interactive behavior was recorded. Prior to coding maternal attunement, the infant's initiating action (IIA) was first determined as a behavior, vocalization, or both. The infant's action direction as to the mother or elsewhere (i.e. at a toy or the stranger) was identified next.

Response type. Maternal attunement or the mother's response action (MRA) was first coded as a behavior, vocalization or both.

Modality. Each attunement was examined whether it was cross modal or same modal. Modality was determined by comparing the IIA with MRA. Attunements were coded as the same mode when the IIA and the MRA were the same type (i.e. both exhibited vocalizations, both exhibited behaviors or both exhibited both vocalizations and behaviors). Attunements were coded as cross modal when the mode of the MRA differed from the IIA (i.e. the infant vocalizes and the mother responds with a vocalization and a behavior, the infant vocalizes and the mother responds with a behavior, or the infant's action is a behavior and the mother responds with a vocalization).

Accuracy. The accuracy of the mothers' attunement was coded by evaluating how well or closely the mother was able to share and match the infant's inner state, focusing on the

intensity of the action. High attunement behavior scores (3) were assigned to those mothers who responded to their infant's action with the same intensity, often via cross modality, and thus presumably were able to share and accurately match their infant's inner state. Medium attunement behavior scores (2) were assigned to those mothers who promptly responded to their infant's action but were not well matched to their infant's inner state in terms of intensity. Low attunement behavior scores (1) were given to those mothers who responded but with much delay or did so in a way to control the infant rather than sharing the infant's inner state.

Reliability

A primary coder coded the entire sample ($N = 59$) and a secondary coder coded 20 cases, and achieved $r = .573$, using Pearson correlations. The agreement was statistically significant, $p < .01$. Although this rate may be considered slightly lower than the field requires, given the exploratory nature of this study, this is judged as acceptable for the goal of this study.

Results

Descriptive Analyses

Frequency. From the sample of 59-mother-child dyads, four mothers did not show any attunement behaviors, thus subsequently were not included in the analyses. For $N = 55$ mother-child dyads, there were a total of 469 attunement behaviors recorded during 3 SSP episodes of 3 minutes each. The range of total attunement behaviors was from 1 to 28 attunements per dyad ($M = 8.53$, $SD = 6.05$). Please note that each minute of each episode includes at least one mother who showed no attunement for that given minute, but all mothers included in this sample showed at least one attunement over the entirety of the three episodes coded. However, of the four mothers that did not attune at all, three of them (75%) were Hispanic.

Episode 2 had a range of total attunements from 0 to 15 ($M = 2.73$, $SD = 2.58$). Episode 2, minute 1 had a range of attunements from 0 to 6 ($M = 1.49$, $SD = 1.35$). Episode 2, minute 2 had a range of attunements from 0 to 4 ($M = 0.73$, $SD = 1.08$). Episode 2, minute 3 had a range of attunements from 0 to 5 ($M = 0.51$, $SD = 0.98$).

Episode 5 had a range of total attunements from 0 to 12 ($M = 3.00$, $SD = 3.04$). Episode 5, minute 1 had a range of attunements from 0 to 5 ($M = 1.15$, $SD = 1.18$). Episode 5, minute 2 had a range of attunements from 0 to 5 ($M = 1.00$, $SD = 1.40$). Episode 5, minute 3 had a range of attunements from 0 to 4 ($M = 0.85$, $SD = 1.13$).

Episode 8 had a range of total attunements from 0 to 10 ($M = 2.80$, $SD = 2.68$). Episode 8, minute 1 had a range of attunements from 0 to 6 ($M = 1.20$, $SD = 1.30$). Episode 8, minute 2 had a range of attunements from 0 to 4 ($M = 0.87$, $SD = 1.04$). Episode 8, minute 3 had a range of attunements from 0 to 5 ($M = 0.73$, $SD = 1.22$).

Modality. Out of total affect attunement behaviors recorded for this sample, the majority were coded as cross-modal. That is, 72% of 469 affect attunements (340) were categorized as cross-modal behaviors and 28% (129) were categorized as same modal behaviors (see Figure).

Accuracy. The accuracy score of mother's response behavior was assigned as high (3), medium (2) or low (1). Out of total 469 affect attunement behaviors, 84% (396) were coded as high. Medium attunement behavior scores were assigned to 14% (66) of the total affect attunement behaviors. Low attunement behavior scores were given to the remaining 1.5% (7) of affect attunement behaviors.

Descriptive Excerpts

Cross modal affect attunement. The following examples show the mother exhibiting four attunements, all differing in modality from the infant initiating action (IIA).

Example 1. Infant is exploring the play setting and looking at various toys. Mother says, “What do you see?” (affect attunement 1: gaze vs. verbal) Baby reaches out for a toy, a ring stack, and picks it. Mother says, “Is that rings?” (affect attunement 2: non-vocal action vs. verbal). Baby then picks up one of the toy rings and smiles, and then puts it in his mouth. Mother says, “Num num” as the infant bites on the toy (affect attunement 3: non-vocal action vs. verbal). The infant crawls to the toy telephone and picks up the receiver. Mother says, “Hello, hello, is someone calling?” (affect attunement 4: non-vocal action vs. verbal) matching the intensity and the duration of her son’s exploration with the specific toy.

Example 2. Infant boy sees a rattle. He reaches for the rattle and picks it up, then after examining it, he begins to shake it quickly back and forth. Mother says “Oh yeah! Does it make noise? Does it make noise?” (affect attunement 1: non-vocal action vs. verbal). Infant then sees the bucket, he picks it up, at the same time he is vocalizing “Bah bah bah”. The mother giggles at the same volume as infant’s vocalizations. (affect attunement 2: vocal action and non-vocal action vs. verbal). Baby then smiles at a toy train and reaches to pick it up. Mother says “Oh the train, is that a train?” as her son is reaching towards the toy (affect attunement 3: non-vocal action vs. verbal).

Same modal affect attunement. The following examples show the mother exhibiting three attunements, all in the same modality as the IIA.

Example 1. A little boy reaches towards the tower of building blocks. He smiles as he gets close and begins to pat his fist on the top. The mother responds to the baby by smiling back at him as he pats the tower of building blocks (affect attunement 1: non-vocal action vs. non-vocal action). The little boy then turns towards his mother, grunts

and grabs her. The mother wipes the infant boy's face, and says "Ohh!" at the same volume and length of time as her son's grunt (affect attunement 2: vocal and non-vocal vs: vocal and non-vocal). The little boy then whimpers and whines, then hugs his mother. Mother says "Aww" long and sad as his whimpers, and rubs his back (affect attunement 3: vocal and non-vocal vs. vocal and non-vocal).

Example 2. A little boy hears the sound of a dump truck toy and this excites him. He smiles at the toy and raises his arms and legs up off of the ground. The mother also raises her arms and shakes them enthusiastically, illustrating the same excitement felt by the boy towards the toy dump truck (affect attunement 1: non-vocal action vs. non-vocal action).

Discussion

This exploratory study sought to determine and examine behaviors that exemplify affect attunement in the Strange Situation Procedure (SSP). The SSP provides an ideal environment to examine maternal affect attunement behaviors because the mothers were given no specific instruction on how to behave toward their infant. therefore, mothers' spontaneous attunement behaviors can be investigated.

One of the main contributions of the current project was to embark on developing a new coding scheme to investigate affect attunement behaviors in a systematic process. This process has not yet been attempted, possibly in part because recognizing subtle behaviors and consistently and confidently judging them as affect attunement would require training and a significant time commitment. To decide on the most effective way to capture this phenomenon, quantitatively and qualitatively, it took several trials before finalizing the current version used in this project. This coding scheme included recording of both the infants' initiating action and the

mothers' response action, and focused on mother's modality and accuracy of response in addition to frequency. Each interaction was examined, at each minute of each episode that was observed. Attunements were coded for 55 of the 59 mothers over the three episodes of the SSP coded. It is worthy of note that of the six total Hispanic mothers in the sample, 50% of them did not show any attunement behaviors, which could be indicative of some cultural factors. However, with such a small proportion of Hispanic mothers in the current sample, no claim can be made and a future study that considers cultural factors is warranted. Nevertheless, it was impressive to see how Stern's work from 25 years ago still holds true to this study even in the constrained laboratory setting of the SSP. We found the phenomenon mostly cross-modal as Stern claimed.

In the present study, we discovered that over 70% of all attunements were cross-modal. And all but one of the 55 mothers, who attuned to their infants, exhibited at least one cross-modal attunement. This is slightly lower yet supporting the study done by Stern et al., which found cross modal attunements accounted for 87% of all attunements recorded. Accuracy, in terms of intensity matching, was also documented as high (3), medium (2) or low (1). Out of a total 469 affect attunement behaviors, the large majority of behaviors were recorded as high accuracy attunements. Just over 1% was considered low accuracy attunements.

Limitations

There were of course, multiple limitations to this study. Due to the exploratory nature of the study, this study does not include statistical analyses, and was done as a descriptive study. The sample size, although larger than most studies done on attunement, was still relatively small. Infant behaviors were not broken down to many more categories, including: vocal, respiratory, gestures, movement of head, body, and limbs, as Stern et al. (1985) presented, which could have

produced more illuminating results. Stern et al. also interviewed mothers after their free-play episodes to examine maternal awareness of affect attunement behaviors, which might have also confirmed the unconscious aspect of the maternal behavior. However, in the present study, this could not be carried out because this study relied on the archived data. Although as stated earlier, the use of the SSP to code affect attunement is advantageous, the SSP may also restrict or interrupt maternal behaviors in some way due to necessary separations structured in the procedure. It is possible that the same mother could more fully engage in affect attunement behaviors in the context with no specific time limit.

Future Research

To expand on the current descriptive study of affect attunement, future studies should include investigation of associations with another phenomenon or paradigm such as attachment or other maternal behaviors to seek statistical analyses. It is also important to compare the affect attunement phenomenon to other constructs of mother-infant interaction. The attachment paradigm obviously offers a good option for comparison with infants' attachment classification. Maternal sensitivity would also be expected to have a relationship with affect attunement; this has not yet been studied. A longitudinal study, examining child outcome, following frequency or the quality of affect attunement would also be beneficial. Moreover, it could be enlightening to further examine misattunements as Stern et al. (1985) did in his study. As Stern looked at misattunements by asking mothers to purposely misattune, it would be fascinating to look at misattunements done by mothers spontaneously to see how infants react. Further research should also include larger sample sizes. Future studies can be conducted, like Stern et al. did, to evaluate the affect attunement phenomenon in a free-play format in the context with unspecified time.

In conclusion, many of the affect attunement behaviors that Stern and colleagues observed long ago are obviously still relevant in this current study. True to Stern et al.'s claim that most mothers attune in a cross-modal manner, this research corroborated these findings with similar displays of cross-modal behaviors. This thesis provides a new foundation for future research by presenting a new coding scheme to systematically code attunement behaviors and examine how a mother shares her infant's inner state through this process.

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Table 1.

Coding for Accuracy of Maternal Response Action

Code	Definition	Example
Low (1)	Mother's response is delayed, routinized, or forced. Does not match infant's inner state for intensity.	I: Clings to M. M: Chuckles and tries to refocus I's attention on toy. I: Whimpers and clings to M M: Says "okay, okay" and tries to reposition.
Medium (2)	Mother's response is genuine but the intensity match is slightly off	I: Cries and clings to M M: Says "We'll okay, you're fine." I: Cries and tries to wrap body around M . M: Says "Do you want to stand up, what do you want to do?"
High (3)	Mother's response is authentic, attentive and accurately matches inner state of the infant.	I: Shakes toy. M: Vocalizes "oh yay" while shaking hands up and down, matching I's intensity.

Table 2.

Frequency Table

Episode	Mean	SD	Range
Episode 2. Pre-separation, child exploration with mother present.	2.73	2.58	0 – 15
Episode 5. Post-separation, first reunion.	3.00	3.04	0 – 12
Episode 8. Post-separation, second reunion.	2.80	2.68	0 – 12
Total Frequency.	8.53	6.05	1 – 28

*Note: While all mothers showed at least one attunement overall, there was a least one mother who did not show any attunements during each episode.

Appendix
Sample Page of Affect Attunement Coding Scheme

• Episode __, Minute __ Time Start: _____

#	Time Start	Description of infant action	IIA ^a	IAD ^b	Description of mothers responding action	MRA ^c	MoR ^d	AoR ^e	Time End
1									
2									
3									
4									
5									
6									
7									

^a=Infant initiating action; ^b=Infant action direction; ^c=Mother's responding action; ^d=Modality of response; ^e=Accuracy of response

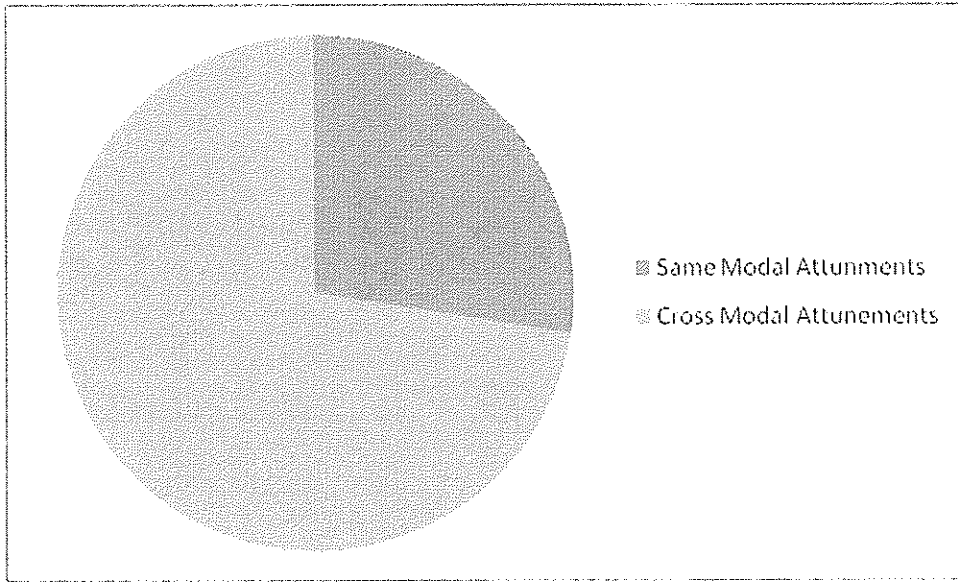


Figure 1. Modality of Attunements