Abstract

This paper reports the findings of a longitudinal observational study of the second language acquisition process of a two year old child. This sociolinguistic and ethnomethodological study focused on the interrelation between the sociocultural, affective and cognitive variables which affect linguistic output and found that the cycle of equilibrium and disequilibrium is a significant motivation for a child to acquire the second language. The state of disequilibrium is especially critical, as it enables a child to internalize the knowledge and to be motivated to move forward. The findings support the hypothesis that the period of disequilibrium seems to interact with second language acquisition most effectively. They also support Input Hypothesis, one of the prevailing theories in the field of the language acquisition. (second language acquisition, disequilibrium, cognitive science, sociolinguistics, code-mixing)

... an essential feature of learning is that it creates the zone of proximal development; that is, learning awakens a variety of internal developmental processes that are able to operate only when the child is interacting with people in his environment and in cooperation with his peers. Once these processes are internalized, they become part of the child's independent developmental achievement. (Vygotsky 1978 : 90)
INTRODUCTION

The effect of nonbiological factors such as sociocultural, affective, and cognitive variables on the acquisition of a first and a second language has received some attention in the recent literature, and the environmental influence of nurture has been claimed to be of significance in the success of second language acquisition (e.g. Brown, 1980; Krashen, 1982; Steinberg, 1982; Hakuta, 1986). This study investigates how nonbiological variables affect the process of the child’s acquisition of a second language and how they are interrelated with linguistic variables. The study also aims to explore when the acquisition takes place most effectively. After a review of the literature and a presentation of the method of the study, the observational descriptions which provide the general foundation for the analysis are given. Then a discussion of each variable follows. Finally, the pedagogical implications of the findings and an examination of current theories of language acquisition are discussed.

NONBIOLOGICAL VARIABLES
IN SECOND LANGUAGE ACQUISITION

The nonbiological factors which may contribute to the acquisition of language include sociocultural, affective, physical, and cognitive variables. To investigate which variables interact how is a difficult task, as these factors are interrelated in a complex fashion and affect the language acquisition process simultaneously. Following the assumption that the acquisition process shows ‘gestalt’ characteristics, I studied all these factors simultaneously while examining the acquisition process in various
situations and settings. The analysis therefore includes a holistic description of these variables, while the discussion is intended to isolate them so as to gain insights into which factors contribute to the success of second language acquisition, and when and how they do so.

Sociocultural Variable

The process of language acquisition is deeply affected by society and culture. Acculturation and linguistic development generally proceed synchronously when the mastery of a second language in a second culture is successful (Schieffelin and Ochs, 1986; Brown, 1987). Second language speakers acquire the second language as a medium or a tool of communication to become a social person in the target language, and at the same time they learn the skill of acculturation while acquiring the second language as a socializing tool. Much research suggests that language acquisition is a social activity and is embedded in cultural systems, such that acculturation begins at the very beginning of a human life (Vygotsky, 1962; Ochs and Schieffelin, 1984).

Acculturation and language sometimes develop separately when social variables negatively affect the acquisition of a second language. In a sociolinguistic study of the “Four Crises” which second language learners face on the way to acculturation, Augustine (1980) explains that the first crisis confronts the learners when they are exposed to a second language in a natural setting. The learners become intolerant about the culture and tend to reject the naturally spoken second language. This type of sociocultural inhibition is also reported by Hill (1970).

Affective Variable

Affective variables which may affect second language acquisition
include emotional factors such as empathy, self-esteem, anxiety, attitude, inhibition, and so on. These factors are closely linked to acculturation (see Brown, 1987, pp. 100-135 for relevant works), cognitive processes (e.g., Ausubel, 1968), and physical conditions, which can also be relevant to second language acquisition (Guiora, Brannon, & Dull, 1972; Brown, 1973). Children who are totally egocentric when very young, become more aware of self and society as they grow older and experience various affective perturbations (see Taylor, 1974 for the significance of affective variables in acquiring native-like proficiency). Guiora et al. (1972) explains that a person who is defensive about his/her own language and shows an inflexible language ego feels threatened and becomes inhibited in order to protect his/her identity when s/he acquires a new language. Such an affective disequilibrium is triggered not only when a person is exposed to a new language system but also when s/he goes through sociocultural, interpersonal, and physical changes.

Cognitive Variable

Cognitive variables seem to be the most important of the nonbiological factors in the successful acquisition of a second language, because cognition operates actively in the acquisition process and is a component of all the nonbiological variables. A child understands the links between individual and social person while interacting with someone, and in the system of social behavior his/her cognitive and communicative functions of language develop. Vygotsky (1978) claims that the acquisition of language develops as a means of communication between the child and the people around him/her and that the social context they produce during the interaction provides the source of intellectual development. According to Vygotsky (1978) (and Piaget (1955) as well, regarding this
observation), the exposure to the society and the need to communicate produce the need for checking and confirming in thinking. This cognitive process of checking and confirming awakens a variety of internal developmental processes, one of which is the notion of equilibration proposed by Piaget (1977).

The concept of equilibration, which I employ in this study as a cognitive structure when a child organizes external social speech into his/her internal intellectual mechanism, is the most essential feature in the hypothesis of this paper as the cognitive development of any social behavior including language acquisition experiences this equilibration cycle. According to Piaget (1977), learning depends on the equilibration of two forces, namely the process of moving from the uncertainty or doubt caused by the mismatch of what a child expects and what the child is expected to do and the state of satisfaction and certainty which occurs when the mismatch is resolved. The former state of cognition is called disequilibrium and the latter equilibrium. Cognitive development in childhood is governed by a cycle of moving from the states of disequilibrium to the state of equilibrium. Langer (1969) reports that disequilibrium is a constructive activity that constitutes the forces of self-development, the affective and intellectual parameters of learning. The concept of disequilibrium seems relevant to what Vygotsky (1978) calls the zone of proximal development, which Vygotsky (1978) defines as follows;

It is the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers. (1978, p. 86)
The zone of proximal development is, therefore, the stage of process that is “currently in a state of formation and is just beginning to mature and develop” (Vygotsky, 1978, p. 87). The state of disequilibrium I claim characterizes the cognitive structure where the development is about to be completed and the ability to realize and solve the problem is potentially latent.

Applying Piaget’s (1977) equilibration phenomenon to language learning, Brown (1980) points out that disequilibrium may provide the key motivation for language acquisition as language interacts with cognition to achieve equilibrium. Rosansky (1975), presenting Lenneberg’s view on disequilibrium, says,

Lenneberg, like Piaget considers that language acquisition can occur in a state of disequilibrium, as he puts it, during a state of “language readiness” which is characterized by disequilibrium and is marked by a state of equilibrium at its close. (1975, p. 93)

Lenneberg (1967) asserts that language acquisition occurs only when disequilibrium is close to a state of equilibrium. What motivates a child to acquire language seems to be a state of disequilibrium. This drives him to break through this state in order to enter a state of equilibrium.

METHOD

Approach and Data

The approach adopted for this study is a combination of sociolinguistic and ethnographic research methods. Research into developmental
phenomena requires attentive longitudinal field work and hermeneutic interpretation. Ideally, data collection should be done in naturalistic situations of various events during a day for a week or a month or even years. The data obtained for samples should not be limited to “purified”, clean data even though it may facilitate the researcher’s job by providing idealized findings. In empirical data which record in natural events and where experimental controls are removed, a great deal of variability is expected. Cross-sectional experimental studies demonstrates the validity of a model which is based on only naturalistic and empirical research (e.g. Erickson, 1977; Agar, 1982). In the present paper I hope to demonstrate the value of an naturalistic approach to the study of a second language acquisition by undertaking a holistic study to discover the values which are significant in the process of second language acquisition. A properly-designed experimental study based on the present findings should be undertaken to verify the value of the findings, as the present study is to be considered an exploratory investigation.

The subject is my own son, Yugo, who successfully acquired English as a second language in a completely natural milieu after he had began acquiring his first language, Japanese, during the first two years of his life. He acquired English simultaneously with Japanese for 6 years in the United States. The research reported here took place during his first 8 months in the United States, from the beginning of 1982 to October of the same year. First language acquisition data which had been recorded spontaneously from the time he began to utter holophrastic speech are also used to compare with his acquisition of the second language. The second language acquisition data were recorded by me and his teacher at a day care center which he attended for about 6 hours a day. His teacher and I carried a small notebook and wrote down immediately his
utterances with comments. His behavior, physical and affective conditions were also recorded in detail. His utterances were recorded in a micro audio tape recorder for approximately 5 hours every Saturday and Sunday and the type-token ratio (TTR) (Templin in Miller 1981) was calculated from a transcription of this data. In addition to the lexical items Templin used, I included phonemic variations and words with morphological variations which I judged to have communicative meaning as data. Numerical figures were used to support findings obtained from the observational and descriptive analyses.

It is still just a myth that universal elements of language are constructed in embryo, and it is not known whether an innate mechanism for language acquisition exists or not. One nativist, McNeill (1970), claims that in holophrastic speech the concept of sentence construction can be observed. Whatever the case may be, it can be safely said that children begin to acquire language at least in the sensory motor period (Rosansky, 1975; Piaget, 1977), and acquire their linguistic world view with the development of sociocultural cognition. This physical domain or rather neurological issue is a particularly important one in this study. A child who has acquired one linguistic and socio-cultural system during or after his sensory motor period might feel uncomfortable about acquiring a new linguistic and cultural system. However, Lenneberg (1967) has suggested that while lateralization begins around the age of 2, it is completed only around puberty when the child begins neurologically assigning functions to one side of the brain. Scovel (1969) suggests that a child's brain prior to puberty is pliable enough to acquire both a first and second language with easy control. There is still much neurological debate concerning the time of lateralization, however. For example, Lenneberg (1967) claims that it is complete around puberty, while others
such as Geschwind (1970) and Krashen (1973), believe it is complete at a much earlier age. The subject of this study was exposed to the second language early enough that his first language was not yet lateralized.

**GENERAL OBSERVATIONS**

In this study I recognized the existence of a cycle of equilibration and disequilibration from Yugo’s behavior. This cognitive notion of equilibration interrelates with other variables. The occurrence of the equilibration cycle in cognition synchronizes with the occurrence of affective (and sociocultural) ups and downs. The observations and the discussion in the following section document the cycle of the equilibration I found.

The four variables which influence the developmental process are illustrated in Figures 1 and 2. The figures are presented in parallel so that the linguistic variables and each stage of the cognitive, affective and physical equilibration cycle (I have combined these variables into one

![Figure 1. Equilibration cycle in development process](image-url)
Disequilibrium and Cognitive Development in Child's Second Language Acquisition

Figure 2: second language output

- where's pictures?
- go/d w/
- don't do that
- just moment...
- I want this
- I want this? ok?
- (Can I have this?)
- I'm put them it(here).
- no, that's danger.

- imperatives
  - eat
  - drink
  - move
  - home
  - look
  - help
  - goway
  - opedoor

- repeated Jap. after Engl.
- pivot speech
- transfer of Jap. morpheme attachment
- TTR=0.34
- TTR=0.34
- TTR=0.34
- TTR=0.34
- TTR=0.34
- TTR=0.34
- TTR=0.34
- TTR=0.34
- TTR=0.34

- repetition, mixing
- kore broken
- mine no chodai
- (give it to me)
- TTR=0.45

- here
- there
- allgone
- more
- hi
- TTR=0.44

- book
- good
- boat

- one word (milk, moon, river, comain)
- TTR=0.00

- TTR=0.02

- TTR=0.44

- age (month)

- 27 (1/82)
- 28 (2)
- 29 (3)
- 30 (4)
- 31 (5)
- 32 (6)
- 33 (7)
- 34 (8)
equilibrium phenomenon here as they are difficult to isolate.) can be compared at each stage of the cycle. The macro knowledge obtained from this longitudinal general observation provides the analytical background for the micro analysis of each variable in the proceeding section.

1st Equilibrium (1/14—1/25)

In a couple of days Yugo recovered from jet lag and began to get bored staying at home because of the snow. Yugo was able to communicate his desires and needs in Japanese; his linguistic ability in Japanese was better than the average for children of his age. The English words he knew at this stage were "milk", "moon", "river" and "comain (come on)".

1st Disequilibrium (1/25—2/12)

January 25th was Yugo's first day at the nursery school. The first two weeks were literally traumatic for him. His perturbation stemmed from the cultural shock. Corsaro (in Schieffelin and Ochs 1986) points out that "language and discourse become the most critical tool for the child's construction of the social world, because it is through language that social action is generated." In Yugo's case, the psychological panic occurred not only due to the sudden exposure to the second culture but also from exposure to the unknown language system. On February 8, his teacher herself realized the cause of his distress and from this date Yugo began to adjust to school day by day. He liked a big butterfly with a letter on it which his teacher had made, and a song they sang before snack. On February 9, Yugo repeated for the first time what his teacher said. His repetition at this stage was only mimicry of the last words she
2nd Equilibrium (2/12—4/29)

On February 10, his teacher said Yugo was perfectly all right at school. His excessive attachment to mother at home had disappeared. He looked sound physically and psychologically. Yugo’s repetition climaxed in the 5th week. According to his teacher, Yugo tried to repeat every single word she said. He repeated whole sentences which she could understand clearly. The visit to our American friends on February 12 also changed Yugo’s attitude. He tried to repeat whatever Maya, a 7 year old American girl, said. In the evening on the same day mixing was observed [kore broken shiteru ne. (this is broken, isn’t it?)]. However, it wasn’t until April 16 that I heard his second code-mixing. During the first week of March, one- or two-word verbal replies appeared at the nursery school. From March 15 to 28, Yugo showed strong affection for his peers by touching them. His teacher explained that it was because he did not understand how to show his affection in the proper way. Yugo also began to socialize with children in our neighborhood who were not native speakers of Japanese. He showed high motivation to associate with them until the first week of May. From April 16, Yugo hesitated to speak English and this avoidance lasted until the middle of May, especially when he was physically tired, but from then on his resistance clearly disappeared and he became very positive about learning English. He even struggled to find appropriate English words to express himself better. On April 20, Yugo started to repeat in Japanese what he said in English, for example, more motto (more), good oishii (good) yo. Mixing appeared at the syntactic level afterward, when he would insert English phrases in Japanese structures, as in for example,
2nd Disequilibrium (4/29–5/14)

Toward the end of April, Yugo began to feel that something was wrong with his environment. Yugo tried to resolve his uneasiness by concentrating on Chris, a classmate 7 months older than he, copying Chris’s every action and utterance. This phenomenon was observed from the last week of April to the first of May. This attitude towards his peers was observed at home too. Trying to make friends, Yugo repeated whatever language the children at the playground spoke — Japanese, Korean, English, Spanish and Portuguese. During this period there was no progress in his English acquisition, except that he uttered one sentence, “This mine” on May 3. Yugo showed reluctance to go to the nursery school in the morning and was fussy about small things and clung to me.

3rd Equilibrium (5/14–6/1)

A ten day trip to the South changed Yugo’s social environment from school, and he was happy to have his parents’ constant attention. Yugo produced quite a few English sentences with new words such as pivot speech and overgeneralization of the possessive forms, for example, “it”, “this”, “that mine’s yours”, “otosa (father)’s”, “good”, and “ship”. On May 30, another type of mixing occurred in his speech. Yugo began to add /tu/ or /du/ (Japanese for do, did, say, said) to the end of his utterances, for example “open door/tu/.”, “It’s broken/tu/”, “Yugo chan (name address form for child) sita /tu/ (Yugo did/tu/)”. Attachment of this /tu/ suffix was observed until the end of June.
3rd Disequilibrium (6/2—6/5)

This short disequilibrium was Yugo’s ‘set back’ period after the vacation. According to his teacher, Yugo’s English productivity dropped to the level of what it had been before the vacation.

4th Equilibrium (6/5—7/1)

Yugo readjusted to his daily routine and was fine physically and affectively both at home and at the nursery school. He spent most of his time outside with his friends until June 22, when a 7 year-old Japanese boy came and played with Yugo at home. From then on, Yugo began to stay inside most of his time at home in spite of my encouraging him to play outside. On June 6, Yugo began to produce English again at home. On June 10 his production of English increased remarkably, and he began to utter telegraphic speech, mostly imperatives such as ‘get up’, ‘eat’, ‘drink’, ‘home’ (go home) and ‘move’. On June 20, prefabricated patterned speech such as ‘allgone’, ‘goaway’, and ‘theresnoway’ occurred in his utterances, and he sometimes replied in English to my questions in Japanese. His teacher, however, did not find any progress in his production until the last week of June.

4th disequilibrium (7/2—7/17)

My second observation of Yugo at the nursery school seems to have made him fall into a state of disequilibrium. Physically he was also beginning to be in poor shape. On July 6, I noticed he didn’t speak English in the car on his way from the nursery school, which he willingly used to do. His English production sharply dropped except on July 4 when he produced English a great deal to communicate with Maya. On July 8, Yugo caused a fever and stayed home ill until July 12. From July
9 to 13, Yugo's second language utterances decreased to nearly null. On July 14, Mrs. Abeln reported that Yugo began to use English again as he needed to use it to communicate with peers.

5th Equilibrium (7/17—)

On July 19 Yugo started to play outside again by himself and was very happy both at home and at school. Yugo’s teacher reported that Yugo’s English production increased especially on July 21 and 22 when he uttered many sentences, the meanings of which she was able to understand perfectly. On July 18, his first patterned speech appeared, though it was still prefabricated, for example, “wheres pictures?”, “Don do that”. On July 28, Yugo began to speak monologues which were incomprehensible, neither in English nor in Japanese, and incorporated a great deal of patterned speech, for example “..... just moment, ......, yes, I want this ....... I want this? (Can I have this? OK?)”. This type of senseless talk such as “..... hai ne (yes, right?) ...... ne (tag question—asking for acknowledgement) ...... poppo poppo poppo poppo (sound of train or ship) ...... aatto ne (ah, tag question, asking for acknowledgement) ...... bon bon bon bon (sound of dram) ....” also occurred in his Japanese acquisition.

ANALYSIS AND DISCUSSION

Children are generally said to be efficient learners of a second language. They are ardent listeners and imitators, and as a result produce a second language fluently with enviable pronunciation. However, the fact is that it is not so easy for them, contrary to general expectations. The observational study of my son’s acquisition of a second
language made possible the investigation of the variables at several levels. The results of the study suggest that these variables affect negatively, or positively, the process of second language acquisition, and help to distinguish what is actually affecting these variables. In this section the significance of each variable in acquisition theory is discussed.

Physiological Variable

As Yugo’s second language acquisition began early enough, before lateralization (if it really exists: see Scovel, 1988 for a discussion of this hypothesis) was completed, Yugo acquired fluent and native like pronunciation. But such muscular coordination may be of minimal importance in establishing the communicative and functional purposes of second language acquisition. What was found to be an important factor in second language acquisition in this research is the interference of physiological variables. Physiological factors such as fatigue, sleepiness, and illness contributed to the pattern of the equilibrium and disequilibrium cycle. The results of the study suggest that second language acquisition and physical condition or physical biorhythm correlate. I was not able to measure scientifically his physical biorhythm, because this rhythm subtly changes, not at a macro-time, but at a micro-time, day by day rate or even from moment to moment, so I tried to examine carefully his physical condition and relied on my maternal intuition. When he was not physically in good shape, or was fatigued, he tried to resist the second language. Yugo even refused to hear English when he was tired, insisting that I speak Japanese, which required less attention and was more comfortable. This physiological resistance against second language acquisition should not be neglected because sometimes it may hinder the motivation to learn and to reproduce the acquired knowledge.
Sociocultural and Affective Variables

Learning a second language involves social and psychological factors such as attitude, motivation, self-esteem, and confidence. Second language learners who have grown comfortable and secure in their own first languages produce inhibitions against acquiring a new sociocultural system and a linguistic and extra-linguistic understanding of that speech community. Differences in cultural beliefs, values, and social order which learners experience hinder a child’s progress in acquiring a new language system, as these variables induce the state of disequilibrium. Some cases of the stress and perturbation which occur when a child is exposed to a new sociocultural community are reported in a number of studies, such as these of Leopold’s Hildegard (in four volume from 1939-1949), Kenyers’ Eva (1938 in McLaughlin 1977), Itoh’s Takahiro (1978), Koyasu’s Fumi (1975), and Yumoto’s Masakazu (ms), and their inhibition appeared in the form of ‘silence’. Yugo also went through silent periods during his disequilibrium. Yumoto (ms) described Masakazu’s sudden burst of English which occurred for the first time after a 6 month silence as ‘the sudden blooming of a hitherto unseen bud’. The second language production of all these children, including Yugo, increased remarkably after the silent period. This fact suggests that the silent period is a phenomenon in which the children’s affective state is disequilibrated but the disequilibration in this period operates as a positive factor (see Alpert and Haber, 1960 in Scovel, 1978 for a similar observation concerning the positive side of anxiety). The children’s acquisition was progressing internally with intense listening and analyzing during this period.

The factors which trigger disequilibrium are sometimes trivial, such as peer pressure, a teacher’s comment, and parents’ criticism, or a minor change in the environment. In the case of the disequilibrium and
equilibrium cycle Yugo experienced, small negative affective variables such as these caused second language regression. What triggered these children to move from affective disequilibrium to equilibrium (both affective and linguistic) is a mystery, but the disequilibrium is often accompanied by the positive impulse to override the inhibitions due to the necessity of communicating in everyday social life. As Hatch (1978) points out, this period contributes significantly to future progress. I claim that the silent period is a good example of the positive side of disequilibrium.

Cognitive Domain

Piaget (1977) claims that social or linguistic experience can have no effect unless the child is ready to assimilate and accommodate his/her experience into his/her cognitive structure, that is, the cognitive development is a prerequisite for learning. On the contrary, Vygotsky (1978) claims that social aspects of experience is more determinative in the child's cognitive development and learning which takes part during the interaction with others around him/her precedes cognitive development and this sequence results in disequilibrium. The analysis of Yugo's equilibration cycles appear to support Vygotsky's (1978) claim. Yugo's disequilibration was triggered by the social and affective factors such as peer pressure which he experienced when he was interacting with his peers. While interacting with others Yugo developed some function which caused the disequilibrium. The state of disequilibrium occurred at the moment Yugo realized the mismatch between his present knowledge and new experience.

The internalization of the new experience operates during the disequilibrium and once it is completed the equilibration arrives. The
striking increases in Yugo’s second language production occurred either at the end of disequilibria or at the beginning of equilibria as shown in Figure 3 and Figure 2. This finding also supports Lenneberg’s (1967) claim that language acquisition occurs in a state of disequilibrium which is close to a state of equilibrium. Although there was a subtle difference in the observations by his teacher and myself with regard to the beginning and the end of each equilibrium stage (we agree that one or two days’ lapse is not necessarily significant in this research), our observations otherwise mostly match. The average of the type token ratios computed in his states of equilibrium (TTR=0.36) was almost the same as that at his transitional periods from disequilibrium to equilibrium (TTR=0.44). This fact reveals that the state of equilibrium was rather his ‘practice period’, using the knowledge he stored in the disequilibrium period and producing during the transitional period. During the equilibrium period Yugo’s production was surprisingly great, but not many new words or expressions appeared.

In his states of disequilibrium, Yugo’s progress in English was nearly nil. During the silent period he did not speak even a word of English. During the disequilibria Yugo was taciturn and listened attentively, and toward the end of disequilibria, he acted in a positive to the second language, producing many new words. As Sullivan (1967 in Brown, 1987) points out, second language acquisition does not progress in a linear fashion, but stepwise, following the cycle of equilibrium and disequilibrium (see Figure 3). Language acquirers progress from one stage of equilibrium to another, and their competence at the next equilibrium is higher than at the previous equilibrium. The work of acquisition which is the act of ‘intake’ takes place during the disequilibrium, and the feedback which is ‘output’ occurs during the equilibrium. Therefore, both equilibrium and
disequilibrium are equally significant for the acquirers. Palmer (1986 in Oller, 1988) claims that the language learners who obtain lots of input but are not required to produce output do not develop a good production. Without the situational requirement to make oneself communicate the knowledge acquired in the disequilibrium period will not manifest itself in actual performance.

At the transitional stages between equilibria and disequilibria, an acquirer is disequilibrated. This stage functions as a force to encourage cognization in which I hypothesize 'intake' dynamically takes place. Boulouffe (1986) likewise claims that the intake process which is intermediary between input and output is a key to the mechanism of learning. My observational analysis supports the claim that the intake period exists at the stage of disequilibrium. When input is provided, there is a stage in which the input is "taken in", that is, the input is discovered, cognitively understood ('cognized' in Chomsky's (1975) term) and sorted out systematically. Intake then eventually produces an output. This is a neat way of explaining the cognitive process of second language acquisition, but it does not provide evidence that intake takes place during the stage of disequilibrium. The linguistic variables in the following sections will provide the evidence to support this hypothesis.
It may well be true that a latent universal language structure is innate to the human species. It is, however, an undeniable fact that linguistic competence develops cognitively. As Lenneberg (1967) asserts, the process of actualization by which latent structure is transformed into realized structure is cognitive, and an infant's cognition is developed by his surroundings. The child's linguistic world view is influenced by the social and affective context in which s/he acquires language. The stagnation of Yugo's second language production at the stage of disequilibrium stemmed in part from the fact that he was cognitively, affectively and socioculturally disequilibrated but in large part he was disequilibrated because he was linguistically confused. The evidences to support this claim are given from his code mixing, which took the form of repetition, morpheme attachment, and senseless talk which innovatively appeared at the stage of equilibrium.

As stated in the above section, following the disequilibrium period, during which the average TTR is 0.015, in the equilibrium period regularly patterned new words and sentences appeared with an average of TTR, 0.36 as shown in Figure 3. Boulouffe (1986) claims that intake is the locus of the learner's active search for inner consistency, and indeed Yugo's production of not only correct sentences but also errors which were regularly patterned and systematic increased impressively after disequilibrium. The systematic structures Yugo created reveal that Yugo developed his own acquisition program to solve the linguistic disequilibrium and registered the two different language systems in his language acquisition program.
Repetition

The use of code mixing was the solution for his cognitive and linguistic mismatch. Yugo used persistent lexical and syntactic repetition of English and Japanese to create semantic redundancy; that is, Yugo frequently repeated in Japanese what he had said in English in order to make doubly sure that he had been understood. Examples of this include utterances like, “more motto (more)”, “good oishii (good)”, and “read yonde yo (read) yonde yo (read) this one this one kore (this one)”. This repetition lasted until Yugo realized that he could make himself understood in English alone to me. Yugo realized at this stage that there are two different linguistic symbols which convey the same meaning and that he had to differentiate them depending on the situation.

Morpheme Attachment

Another example of the code mixing is a systematic attachment of the /tu/ or /du/ [Japanese baby talk which correspond to ‘to bokuwa iu’ or ‘to bokuwa itteiruyo’ (‘I say that’ or ‘I’m telling you that’)] morpheme to the end of his utterances during his 32nd to 35th month. For example, Yugo said “It’s broken/tu/ [(I say) it is broken.]” which constitutes two underlying structures, ‘I say’ or ‘I am telling you’, and ‘it is broken’. In the process of his first language acquisition, from his 18th to 24th month, Yugo created this suffix, the syntactic and pragmatic use of which is idiosyncratic. For example, Yugo said “Jii chan pappa suu/tu/ [(I say) grampa smokes a cigarette.]”, or “Densha bai bai su/tu/ [(I am telling you) the train goes away.]” The intralingual error which operated as a communicative strategy for a certain period during the acquisition of his first language was stored in his memory and was recalled as the same strategy for a certain period of time during his
acquisition of the second language. That is, Yugo transferred the
cognitive structure he created in the first language to a second language
in order to convey what he wanted to say. The point which needs to be
stressed is that Yugo experienced a similar disequilibration in the process
of both first and second language acquisition and had the ability to use
the previously acquired strategy consistently (in this case the morpheme
/tu/ or /du/), to convey his intentions (he knew the meaning of /tu/ or
/du/ but the use was incorrect both in Japanese and English). This
intake process began in the period of his disequilibration.

Senseless Talk

The incomprehensible utterances mixed with comprehensible words
occurred both in Japanese and English when Yugo was reading a book,
playing with toys (though he was talking by himself, at both events
someone was always with him), and talking to someone. Yugo's
senseless talk, which appeared during his equilibration period, was very
fluent and continued for a fairly long time once it started. By speaking
Yugo monitors his speech introspectively and with the help of his speech
he expands the imaginary world. These monitoring and individual-creati-
on operate simultaneously. Vygotsky (1978, p. 26) explains that it is
natural and necessary for children to speak while they act because they
"solve practical tasks with the help of their speech". The reason why
the child can solve the task with his/her own speech is because the
child can interact objectively with what s/he is verbally producing and
create a new idea on the basis of what s/he has said. In addition to this
reason, another possible reason is that Yugo was showing his participation
in activities by "talking". Talking to the objects and books as well as to
persons involves communicative intention of some kinds. As Dorval
(1990) found the examples of the child’s monologic talk are dialogic. Yugo’s monologic talk was also dialogic. Yugo seems to have developed the senseless speech from the internal demand to speak in order to socialize with external objects and people. As Yugo did not have enough varieties of language stock to interact with the object at hand, he created some “sound-talk” which did not make any sense for adults but had communicative functions for him, just like /tu/ or /du/ morpheme functioned to convey his intention.

Input and Affective Filter Hypotheses

The equilibration and disequilibration cycles Yugo developed raises a question as to actual learning: how does the learner move from the “non-knowing” stage to the knowing stage, and how does s/he use context to give structure to abstraction. The learner’s cognitive growth arises from “the occasional mismatch between his theory of the structure of the language and the data he receives” (Brown and Hanlon (1970, p. 50) and from the accommodation system in which s/he perceives new views and integrates them. The confrontation (or assimilation process) s/he faces between a first accommodation and a new mismatch will provide the impulse for progress. The first accommodation is recalled as a ‘discrepancy’, and the conflict results in an equilibrated accommodation (Boulouffe 1986, p. 246). The transition between the first accommodation and the second accommodation creates an intrinsic motivation in the learner for progressing toward higher achievement. A child is sensitive to exogenous incentives and makes progress through his/her search for self-consistency (Ervin, 1976; Clark, 1974; Krashen and Scarcella, 1978; Wong-Fillmore, 1979 in Boulouffe, 1986).

The cognitive accommodation process supports Krashen’s (1985)
Input Hypothesis which claims that we have the ability to understand "input that contains structures at our next 'stage' ---structures that are a bit beyond our current level of competence" (Krashen, 1985, p. 2). The cognitive motivation to overcome one stage of disequilibrium to reach the next equilibrium is a natural form of behavior which accompanies any stage of cognitive development in human growth. The process of language acquisition is no exception to this. What is significant in the Input Hypothesis is that the learners are able to understand the unacquired structure for the contextual information and generate it as a grammatical rule. However, the learners acquire only what they need at the particular stage of acquisition. Yugo heard quite a lot of input at a day care center but the output at the equilibrium period was limited to the words and phrases which are minimally necessary for him to make himself communicated at that particular situation. When Yugo learned that he could communicate more effectively with other words and his motivation to do so led to the next cognitive and affective disequilibrium, Yugo took just enough from the affluent input to serve his immediate needs, and internalized it. The point to be noted is that intake takes place only when he realizes that he needs to communicate and so does the output. Krashen and Terrell (1983) claims that speech 'emerges' when the time is ripe. Yugo's production process suggests that words do not 'emerge' but are produced as a result of the internal need to communicate with someone and the external pressures (e. g. peers and caretakers) which force him to speak.

With regard to the controversial issue of the primacy of perception or production, it is plausible to judge from the evidence of Yugo's development that perception precedes production. As his data shows, the knowledge which is required for his immediate communication is acquired
prior to the actual production at the period of disequilibrium during which production was almost nil. The data supports Krashen’s claim that “speaking is a result of acquisition” (1985, p. 2), which contradicts the result of Sheldon and Strange’s (1982) experiment testing the /r/ and /l/ distinction in English by Japanese students. The mastery of a phonological distinction such as /r/ and /l/ does not require the same amount of cognitive internalization as the acquisition of lexical and syntactic meanings. Producing the /r/ and /l/ distinction is mastered rather physically. Japanese students learn these differences at an early stage of the learning English, in junior high school where the differences are stressed and the students are instructed on the positions of the tongue for each sound. As Krashen (1985, p. 38) points out, the students in Sheldon and Strange’s experiment use this conscious knowledge for production. On the other hand, the Japanese students seldom receive training in the perceptive distinction between the /r/ and /l/ sounds, and as a result the students in the experiment could not perform well on the perception task even though they knew the phonological differences between the two sounds. To investigate the differences between production and perception, the longitudinal process of acquiring the sounds should be studied, beginning when the students are introduced to the sounds.

Another critical issue to be discussed here in relation to the equilibrium and disequilibrium cycle is the Affective Filter Hypothesis (Dulay & Burt, 1977; Dulay, Burt and Krashen, 1982; Krashen, 1985). Krashen (1985) claims that all input from the second language goes through the affective filter which functions as a mental block to prevent the acquirable input from being internalized. According to Krashen, when the affective filter is high, the input which is otherwise taken in does
“not reach the LAD” (Krashen, 1985, p. 3). Contra Krashen’s hypothesis, Yugo’s intake seems to have taken place effectively even when the affective filter was high, namely when he was in the state of disequilibrium. However, production is much greater in Yugo’s data when the affective filter is low, that is, at the period of equilibrium. Thus, the data partially supports Krashen’s hypothesis but suggests that the filter naturally becomes high when the learner is exposed to input which is a bit beyond his/her current level of competence. However, the high filter acts as a motivation for effective perception, because the learner desires to lower the filter by overcoming the current discrepancy. The learner also has an ability to lower the filter by taking in only the comprehensible input which is appropriate amount for his/her immediate need.

CONCLUSION

In sum, I have argued that disequilibration is a necessary condition for the successful second language acquisition. This hypothesis has been supported by an observational and sociolinguistic study of my son’s acquisition of English as a second language. In this study two important results were found. One is that in the acquisition of the second language a child experiences a cycle of equilibrium and disequilibrium which continues until acquisition ceases. Another finding is that disequilibration occurs when the child develops the social, affective and linguistic uncertainty while interacting with people in his/her environment. This finding suggests that realizing the discrepancy while interacting at the immediate situation is the basis for the development of the second language and upon knowing the discrepancy the child has already began to acquire new words.
Cognitive, socio-cultural, affective, linguistic and even physical variables act interdependently to trigger the occurrence of the disequilibrium, so it is hard to define which variable affects explicitly the equilibration and disequilibration cycle. While the process of ‘intake’ is disequilibrated, production takes place when the child is equilibrated. During the ‘intake’ period, a child is not motivated to speak but s/he is extremely attentive to the second language while s/he searches, reexamines, adjusts and finds a solution to the cause of disequilibrium. In contrast, during the ‘output’ period, a child is linguistically motivated and production increases. However, the fact that the type token ratio during the production period is not as high as during the transitional period from disequilibrium to equilibrium reveals that the production occurs when the affective filter drops, so that the child is simply “performing” what he has already acquired. The child’s second language acquisition interacts most effectively with cognition during the disequilibrium and the transitional periods, when the speech s/he is going to acquire and the external activity are still independent but are about to converge.

These findings imply that in actual second language teaching, control of the affective filter is significant for effective teaching. Raising the filter and the timing of when to raise it will be a key teaching strategy. The input per se is not enough to motivate the learner to produce a new form. Rather, the learner is motivated to progress when s/he realizes that there is a more effective way to convey his/her intention which so far s/he has failed to express. The motivation needs to be provided deliberately by an instructor, even though it may cause the learner to enter a state of disequilibrium.
Acknowledgement: I wish to thank Professors H. D. Brown and Muriel Saville-Troike. I developed the idea of this paper in their seminar classes at the University of Illinois in Champaign-Urbana. I am equally indebted to Mrs. Mary Abeln, Laura Jo Downing and Ron Scollon, and Yukio Ohtsu and Nobuyuki Ueda for their discussions and comments from education, linguistics, and psychology respectively.

REFERENCES

H. Burt & M. Burt (Eds.), Viewpoints on English as a second language (pp.95–126). New York: Regents.


Disequilibrium and Cognitive Development in Child’s Second Language Acquisition

speech and production (pp. 87-99). Frankfurt-am-Main: Lang.
Yumoto, Kazuko. ms. Preliminary study of child’s second language acquisition.