A SOCIOCOGNITIVE MODEL OF BILINGUAL DEVELOPMENT

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The present article proposes a theoretical approach to bilingual development that is in line with general guidelines on language behavior. As we view bilingual development as a particular case of language development we first present a general approach to language development. We argue that language development is dependent upon a number of prerequisites; this includes socialization processes, the development of the functions for which language will be used, and the existence of language-behavior models in the child’s environment. The principal feature of this model is that it attempts to take simultaneously into account a macrological analysis at the societal level, a micrological analysis at the individual level and the interface between both. In accordance with the Bates and MacWhinney approach, we suggest that language develops through a constant form-function, form-form, and function-function mapping. We apply this approach to bilinguality and analyze a number of case studies of bilingual development.

Keywords: bilingual development; bilinguality; languages in contact; child bilingualism

In the present article, I propose a theoretical approach to bilingual development, which is in line with general guidelines on language behavior. As we view bilingual development as a particular case of language development, we must first present a general approach to language development. Generally speaking, language development is dependent upon a number of prerequisites; this includes socialization processes, the development of the functions for which language will be used, and the existence of language-behavior models in the child’s environment. The principal aspect of this model—first presented by Hamers and Blanc (2000)—is that it attempts to take simultaneously into account a macrological analysis at the societal level, a micrological analysis at the individual level and the interface between both.

One main assumption in our behavioral model of languages in contact is that similar mechanisms occur for group language behavior, for individual behavior and for bilingual development; furthermore, this model must integrate in a more general model of language behavior. The final aim is to propose a model for the developmental of bilinguality. By bilinguality, I understand the psychological state of an
individual who has access to more than one linguistic code as a means of social communication; the degree of access will vary along a number of dimensions which are psychological, cognitive, psycholinguistic, social psychological, social, sociological, sociolinguistic, sociocultural, and linguistic (Hamers, 1981).

The present article is divided in four sections:

a functional approach to language behavior,
a general model of language behavior,
an application of the model to bilingual development, and
case studies of bilingual development.

A FUNCTIONAL APPROACH TO LANGUAGE BEHAVIOR

Language behavior does not and cannot exist outside the functions it serves. By this, we mean that language is in the first place a tool developed and used to serve a number of functions, both social and psychological, which can be classified in two main categories: communicative and cognitive. Language is distinct from communication but is used as a tool for it. It does not exist in itself but has a use for the overall behavior that is meaningful in a given culture. In this sense, language cannot be isolated from other aspects of behavior. When language is processed it is intermingled with cognition and emotion (socioaffective aspects).

According to Bates and MacWhinney (1982), the functional level is where all the meanings and intentions to be expressed are represented; the formal level is the one in which all the surface forms used in the language are represented.

The basic communicative and cognitive functions are universal. In contrast to the stability of the communicative and cognitive functions, the particular surface forms that are used to encode these functions vary greatly across languages. Function plays a strong causal role in the way particular forms have evolved over time and in the way those forms are used by adults and acquired by children.

In Halliday’s (1973, 1975) perspective, language is not just a device for generating structures but is seen as a potential for making meaning. The linguistic system is only one form of the realization of the more general semiotic system, which constitutes the culture. Functions precede forms in the development and use of language, in the sense that forms are mapped on the function to be served.

Linguistic structures mediate in the function of communication between two interactants; they take their meaning from experiential infralogical structures and they enable these infralogical structures (plans, schemata, scripts, or scenarios) to be reencoded into logical
structures such as classes, relations, and propositions. For example, linguistic structures will enable someone possessing the scripts for “eating at home” and “at the restaurant” to re-encode them in classes of places where to eat and of appropriate behavior to use in these places.

Although the study of language can be conducted at several levels of analysis, in our view the nature of language behavior, like that of other complex human behavior, remains the same regardless of the level of analysis.

First, there is a constant interaction between the dynamics of language behavior at the societal level and language behavior at the individual level. In other words, while at the individual level we view language behavior, at least in part, as the outcome of societal factors, we consider also that language behavior at the societal level is the outcome of individual language behavior.

Second, at all levels and between levels there is a constant and complex mapping process between the form of language behavior and the function it is meant to fulfill. We consider that the approach of the competition model used at the individual level (Bates & MacWhinney, 1982; MacWhinney, 1987a, 1987b) applies equally at the societal level.

Third, language behavior is the product of culture and as such it follows the rules of enculturated behavior. It is not a mere product of a biological endowment, but it is a product of culture, transmitted from one generation to the next in the socialization process and appropriated by each individual. In turn, language behavior molds culture, that is, cultural representations are shaped by language behavior.

A fourth characteristic of language behavior is self-regulation. By this we mean that a behavior is not a mere response to stimuli but that it takes into account past experience; furthermore, it does not follow a trial and error pattern but is an evaluative response calling upon the individual’s cognitive and emotional functioning and adapted to a given situation.

Finally, one concept central to this dynamic interaction between the societal and the individual level is valorization. By valorization, we understand the attribution of certain positive values to language as a functional tool, that is as an instrument that will facilitate the fulfillment of social and cognitive functioning at all societal and individual levels (Hamers & Blanc, 1982, 2000, pp. 8-24). For example, in a mixed-lingual family where both educated parents use each of their languages to fulfill all social and cognitive functions with the child, the child will learn to use both languages for these functions and thus valorize both languages, which he or she will consider interchangeable. Examples of these can be found in a number of bilingual children biographies, such as Ronjat’s (1913) and Leopold’s (1939-1949). For example, in the case of a mixed-lingual French-English family, where both parents are highly educated and where both languages are used for all social and cognitive functioning, around and with the child, the child is
likely to develop both type of functions in both languages from the onset of language development onwards and thus valorize them both as social and cognitive tools. The concept of valorization is of the utmost importance in language contact situations.

In addition, when two languages are in contact there can be a state of equilibrium between the two languages at each level and for each form-function mapping in which case the use of both languages is constant and predictable. Any change of the relation between the two languages, due to a change in form-function mapping or to a change in valorization at any level, will provoke a change in language behavior.

Interactions between the dynamics of individual behavior and the dynamics of the environment are current in biology and in evolutionary sciences. For example, the Neolithic revolution started with a change in individual behavior, as a few humans started cultivating edible grasses rather than gathering them; when the behavior spread and was adopted by a growing number of individuals, it started shaping the environment and woodlands gave way to cultivated fields; as cultivated fields spread, they in turn influenced the structure of the society, which became organized around agriculture; this, in turn, changed the structures and called for a more collective behavior in production and distribution, thereby changing the power relations in the society.

Thus, a new form of individual behavior (cultivating) served the function (need for food); when this mapping of form and function, that is when the new form of behavior became linked to the existing function, spread to a large enough number of individuals, this in turn changed the form of the landscape (from woods to fields), which came to serve the function of food growing. This twofold interplay between individual and society and between form and function is characteristic of processing in complex human behavior.

In our view, a similar dynamic occurs in language behavior, between the individual and the societal level accompanied by a complex interplay of form-function mapping.

This can be illustrated by the following example, taken from the work of Schmandt-Besserat (1992) on the origin of writing in Mesopotamia:

Before a new language behavior (i.e., writing), could come into existence, it started as a single mapping between form and function.

Tokens with a specific shape (form) were designed and used as symbols for specific objects (e.g., a jar of oil) with a view to recording agricultural products (function); these symbols were first used in a one-to-one relationship with the objects (e.g., five ovoid tokens stood for five jars).

Next, a primitive system of counting appeared (one token was marked with five incisions).
An important step was taken when an ovoid token (form) no longer represented a specific jar but the concept of jar (new function) and when the incisions represented an abstract concept of number.

By introducing this system of counting (form), a large number of functions could be served; abstracting the concept of number enabled people to count any object.

However, this did not happen before the use of the tokens had spread to a large enough area of the Ancient Near East and were used by a critical but not necessarily large number of individuals.

This critical mass consisted of a few individuals who had power and status in the society (bureaucrats, administrators, and scribes).

Each individual who had to use the system had also to develop the new concepts at the individual level. For example, at the cognitive level, a distinction had to be made between "how much" and "how many." Each new form invented had to serve a specific function.

In turn, creating a new form-function mapping and a new system would first be reflected in the individuals’ use of language and in a next stage in the language used in society. By creating a new system, new forms had to be invented not only to designate the new concepts (e.g., forms to denote 50, 250, 2,500, but also to express the relations between 5, 50, and 500). These signs expressing abstract numbers indicated a new threshold in counting. When abstract counting was appropriated by the society, it gave rise to a new system of data storage and communication with the development of numerals and pictography, that is, a writing system, which, in turn, would facilitate the development of a type of literacy. Where these functions were unnecessary, neither numeracy nor literacy developed.

In a similar vein, introducing an individual to the language used in literacy, mainly through the means of learning to read and write, will induce changes in his or her language behavior. For example, processing a written text calls to a greater extent on the use of decontextualized language. When few people were literate, the behavior of individuals was changed with little effect on the social structures. As more and more people become literate, mapping linguistic forms onto new cognitive functions and as a critical mass is reached, a need for new social institutions, such as schools (form), is created. In turn, these institutions serve the function of literacy; as the need to fulfil this function continues to grow, new norms, which evolve into a recognized fundamental right for education (form), are created. This in turn, will shape individual behavior: when schooling becomes compulsory, all individuals in a given society are expected to master reading and writing, thus shaping their own individual behavior.

In his competition model MacWhinney (1987b) suggests that in language development, mapping occurs between two levels, the functional and the formal; this two-level mapping between function and linguistic form is based on the assumption that linguistic forms are developed to express meanings and communicative intentions. As language develops, form-function mapping is not necessarily a one-to-one correlation:
a single form can be mapped on different functions (e.g., it’s cold in here might have a referential function, meaning the temperature is low, or an instrumental-regulatory function meaning turn on the radiator). Conversely, a single function may be served by several linguistic forms, as in the case of an order that can be expressed by an imperative, an interrogative, and so on.

Furthermore, three types of mapping are involved: form-function, function-function, and form-form. These three types of mapping do not work independently in the language system but occur together; for example, for the utterance I eat, a form-function mapping I(agent)-I(linguistic form) occurs simultaneously with a form-function mapping I(agent)-eat(verb form), a function-function mapping I(agent)-eat(act) and a form-form mapping I(linguistic form)-eat(verb form).

Similar phenomena can be observed at the societal level. A typical example is provided by pidginization. Pidgins are auxiliary languages (form) developed for the purpose of minimal communication between individuals speaking mutually unintelligible vernaculars (function). The pidgin is characterized by limited and simplified forms. As the need for communication increases in the society (function), so new forms are created by the speakers. Gradually these new forms serve extended functions. Eventually the pidgin can become a Creole (form) and the mother tongue for the next generation.

The forms of language are not static but undergo constant changes due to social changes (for example, a change of accent as a sign of distinctiveness, or language planning), new technologies, and contact with other languages. New forms apply to old functions (as for example, when a new expression is used by teenagers) in the same way as old forms apply to new functions (as for example the word save in using a computer), or new forms can be developed for new functions (e.g., new terminology). Forms can be created or borrowed from other languages.

At the individual level, higher order behavior is self-regulated. That is, a behavior is not a mere response to a stimulus, but a response to an integration between a stimulus, past experience, and an evaluation of the predicted outcome of the behavior. Although the behavior is performed, the individual takes into account feedback mechanisms and readjusts constantly his behavior. A typical example of this type of behavior is speech accommodation in interpersonal communication interaction. We argue that similar mechanisms occur also at a collective level (Jourdan & Keesing, 1997). For example, in the process of pidginization, a group of speakers from different cultural and linguistic backgrounds adjust to their new situation by developing a new code to communicate both with one another and with their masters.

All societies value language as a tool of communication and cognition; however, they tend to valorize certain functions more than others (e.g., the cognitive function). If different varieties of language are present in the society, one variety may be valued to the detriment of
others. A similar situation obtains in the case of multilingual societies. One or more languages will be highly valued, whereas others will be devalorized.

At the individual level, a similar mechanism operates. To the extent that the adults around the child value the use of language for certain functions, he will also value the use of language for these functions and thus develop these aspects. The extreme importance of valorization is evidenced at all societal and individual levels. For example, at the societal level, if a minority language is not valorized and used as a tool for education, language attrition and language shift are likely to occur. At the individual level, the positive valorization of all or some of the values linked to the formal and functional aspects of language will help to elaborate and trigger off a motivational process for learning and using those aspects of language.

To sum up, in analyzing language behavior, we should focus on different societal and individual levels: societal (institutions, groups, and social class), social networks and interpersonal relations, and individual (developmental, socioaffective, cognitive, and neuropsychological processes as well as language behavior).

At each of these levels, we must view language behavior as dynamic: There are constant interactions between the determining factors within and between these levels; for example, we cannot draw a complete picture of lexical development unless we also take into consideration relevant aspects of syntactic development, cognitive growth, interpersonal relations, and social class.

Language behavior is the outcome not only of the multiple interactions between different factors but also of social and psychological mediating processors. For instance, a social determinant or a pattern of cultural behavior like social class does not influence language production directly, but is mediated by the social networks; the acquisition of a second language is not only a function of the teaching method, but is also mediated by, for example, attitudes in the community and by individual motivation.

A GENERAL MODEL OF LANGUAGE BEHAVIOR

In the following model, we use the functional approach to language behavior described in the preceding section. In this functional approach we view language processing as a sequence of levels of processing embedded in one another, that is, the micrological levels are imbedded in more macrological ones. If, for example, we analyze language processing at the level of social networks, it is embedded in language processing at the societal level; if we consider language processing at the interpersonal level, it is embedded in social networks;
language processing at the personal level is in turn embedded in interpersonal relations. Society is also a multilevel construction: language as shared behavior is processed in terms of rules, norms, and roles; this behavior can be analyzed in terms of institutions, classes, or groups. In a similar way, at the individual level, language behavior is processed in terms of development, cognitive functioning, social psychological mechanisms, neuropsychological functioning, or linguistic output. These different levels of processing are not independent from one another.

The interface between the societal and the individual levels is situated in the interpersonal interactions actualized through the social networks (Hamers, 1987). Our approach is schematized in Figure 1. It must be pointed out that language behavior is present at all levels A, B, C, and D. However, each level will be present at different times: $X_0$, $X_1$, $X_2$, and so on. Given that a language behavior occurs at the time $X_i$, this behavior produced by an individual will result on the one hand from an interplay between embedded structures (i.e., the social structure, the social networks, the interpersonal interaction occurring at
the time X₁); and on the other hand from the same interplay at an ear-
lier time, X₀. This earlier interplay is a determining antecedent (past
experience) from the onset of language development onwards, which
will play an important role in self-regulating the present behavior. In
addition, present language behavior is likely to play a role in shaping
future collective language behavior provided that a critical mass is
attained. A critical mass presupposes a number of speakers but the
size of the mass may vary as a function of the power and status of the
speakers.

At each level, we consider that similar mechanisms operate: an
intake (i/t) from the previous level will integrate with elements from
the present level, including past experience and present evaluation (x)
and will through self-regulation, feedback mechanisms, and form-
function mapping produce an output (o/p) that will serve as input (i/p)
for the next embedded level.

At a time X₁ level PROVIDES AN INPUT (a) for an embedded level
(B); at level (B) all or part of this input is restructured as (b) (intake),
which is integrated with some specific characteristics of (B)(xb) to pro-
duce ([b]; xb).

Let us take as an example a bilingual situation (i.e., the case of
French and Arabic in France). The societal level (A) provides an output
(a) of two languages with a status difference, a high status official lan-
guage, French, and a low-status immigrant language, Arabic; French is
dominant over Arabic. Both languages are unequally valorized in the
society.

At the social network level (B) there will be an intake (b) from this
status difference, which will be integrated with the status of Arabic as
the mother tongue, that is more valorized and the language of commu-
ication in the network (xb) to produce ([b]; xb). These two elements
integrated together ([b]; xb) will re determine the relative status of
French and Arabic in the network: French might still be perceived as
dominant, but Arabic will be more valorized, used to a greater extent
and serve more functions (e.g., communicative and affective functions);
mapping of the choice of language onto a given situation will occur in a
different way from the preceding level. The use of both languages in
the network will differ from the use of both languages in the larger
society.

The use and status of both languages in the social network ([b]; xb)
will in turn serve as input for interpersonal communications (level );
with an intake (c) from this input, individuals will integrate their own
contribution (xc) (for example the degree of mastery in both languages)
to produce ([c]; xc).

At the interpersonal level (C), which is the interface between the
societal and the individual levels, Arabic (along with French or not)
will be transmitted as the mother tongue to the infant with a status
perceived in the interpersonal relations.
At the individual level (D) the child will first develop Arabic as his mother tongue with the presence of some French around him; as the child’s social networks extend to include the school and the peer group, the relative status and valorization of both languages will change and the intake from the interpersonal level will vary: the input of French will increase drastically.

The child’s intake \((d)\) at level from the interpersonal relations in the networks (in terms of status and mastery) will be integrated with its own specific characteristics \((x_d)\) to produce \((d; x_d)\), which will determine linguistic output.

It must be borne in mind that the child’s characteristics include the intake received at a time \(X_o\), that is all former experience, including the developmental aspects. It must be noted that this personal input in the infant is limited to a communicative and language potential whereas in the already socialized adult it includes a number of social/emotional and cognitive dimensions.

The interplay between the intake during childhood and the developing characteristics of the child (e.g., cognitive development) \((d; x_d)\) will in turn produce the final individual language behavior of the adult speaker at level (D).

This is however not a linear relation as level (D) will in turn provide an input for level (C), which will receive an intake \((e)\), which will, in turn, integrate it \((x_e)\) to produce \((e; x_e)\), and so on until it produces an input \((f)\) for level (A) at a time \(X_2\).

For the individual input to have an effect on level (A) a critical mass must be reached. For example, if enough individuals use and want to maintain Arabic and if they have enough power and status, they can impose new institutions such as schooling in Arabic. This will, in turn, change the social structures, which will affect the language behavior of the next generation.

Before we can apply these general principles to the development of bilinguality, a few words must be said about language development. Modeling of language behavior has been developed to a greater extent at the individual level than at the societal level. Generally these models are rooted in a larger framework of psychological theorizing. For example, Bruner (1990) views language development as part of a general model of cognitive development rooted in social interactions; Piaget’s (1970) constructivist approach to language is embedded in a more general approach to human behavior, calling on a model of equilibrium between adaptation and accommodation; Bates and MacWhinney’s (1982) competition model is a general psycholinguistic model of language processing based on a connectionist approach of the study of behavior. According to Pinker (1996), a comprehensive theory of language acquisition must consider the following aspects: the state of the child at the onset of acquisition; the linguistic input and its context; the mental algorithms that turn this input into knowledge about
the language; the end state of the process (i.e., a grammatically competent speaker), and the evolution of the process (i.e., what children understand and produce during the acquisition process).

As explained in our guidelines, there is a constant interaction between the dynamics of language behavior at the societal level and language behavior at the individual level. The child must internalize the language behavior present in his environment (i.e., the language behavior used in the interpersonal interactions with the significant others in his social network). (a) Through the process of language socialization the child internalizes the different forms and functions of language. (b) There is a constant and complex mapping process between forms and functions. (c) Mapping processes are particularly important in the development of language as a tool for social interaction and for cognitive functioning. (d) The internalization of forms and functions enables the child to develop social-psychological processes that enable the child to develop its own social identity. (e) Internalization also permits the use of language as a cognitive tool; furthermore, it plays a constructive role in the growth of cognitive processes. Language is stored in the form of both social/cultural and propositional representations that are shared by a community; the growing child organizes interactive events into more and more complex schemata. As the child develops his own cognitive processes language in turn becomes an object of cognitive analysis. (f) As language is a functional tool, valorization and motivational processes are central to its use and development. And (g) language behavior is a self-regulated behavior. When two languages are present in the child's environment the same processes operate but each language will be involved to a different degree.

By language socialization we mean that the child is socialized in the use of language as well as socialized through language; there is a constant interplay between these two mechanisms. Language socialization is the mechanism by which language behavior input from the social environment is transformed into intake for the child. Internalization is the mechanism by which the intake is appropriated by the child. This appropriated intake is further transformed to be used in social and cognitive processes. Language socialization occurs through the interpersonal interactions in a social network.

Through the socialization process the child will also develop his social/cultural/ethnic identity. The child identifies with the adults around him. The roles played by these adults are to a large extent determined by the hierarchical structure of society and they receive differential values from society. The child will not only perceive these different roles but also the values that society attributes to them. He will perceive himself as a member of a cultural group and of the different social subgroups with which he identifies; having internalized the values of the cultural and social groups, he will attach personal values
to this group membership and its values and build up his own belief system. To the extent that certain aspects of language behavior (e.g., literacy), are important values for the group, they will become important personal values for the child. We refer to this process as the valorization process of language that plays an important role in bilingual development.

When the child begins to develop linguistic forms, in a first stage there is a one-to-one correspondence between form and function and the child recreates language, in functional terms, using his own forms and rules. In a second stage, the child’s utterances begin to be pluri-functional and words from the adult language can be identified in his speech. It is also at this stage that he begins to separate his utterances into two main categories of functions: he uses language on one hand to satisfy his communicative needs; on the other hand he makes use of language as a cognitive organizer. This usually coincides with a dramatic increase in vocabulary and with the development of dialogue; the child’s utterances evolve from holophrases (one-word utterances) into more complex linguistic structures, which combine words in a rule-governed way. From this functional base, the child is now ready to develop the linguistic forms and rules approximating to adult language (Halliday, 1975).

Once language is used as a communicative tool, it evolves into a tool of cognitive functioning: the child can develop what Bruner (1971, 1975) calls “analytic competence,” that is, the conceptual-linguistic abilities involving “the prolonged operation of thought processes exclusively on linguistic representations (and) propositional structures” (Bruner, 1971, 1975).

We add to this the importance of language valorization, which is of great relevance when more than one language is involved in language development.

A comprehensive model of language development should take into consideration the several aspects of language development we have just discussed. The roots of language development are to be found in the interpersonal interactions occurring in the child’s social environment, which provide the child with a model of language behavior. Through internalization processes the child appropriates the social values, forms, functions, and existing form-function mappings of language. These functions and forms are valorized and will contribute to the elaboration of the child’s social identity. This valorization will further motivate the child for learning and using more form-function mappings. To the extent that linguistic forms are mapped onto communicative and cognitive structures in the environment, these processes will lead to the growth of communicative linguistic, conceptual-linguistic, and metalinguistic competencies. These developing processes are also influenced by the previous language experience and previously developed representations. The development of the concep-
tual linguistic competence and its accompanying processing mechanisms will lead to the further development of language as a cognitive tool and to the processing of language as an object of analysis.

There is an interrelationship between the different components of language-competence: (a) the communicative linguistic competence in which language is put to an interactive use; (b) the conceptual linguistic competence that requires the manipulation of language as a cognitive tool, as for example in the decontextualised use of language; and (c) the metalinguistic competence in which the child pays attention to language forms, speaks, thinks, comments about language, and is conscious of his ability to manipulate language. To the extent that language is used for these different functions around and with the child, he will valorize each of these functions, and thus, develop each of these competencies.

The competence attained in the communicative-linguistic processing, the conceptual-linguistic processing and the metalinguistic processing of language will, through feedback mechanisms, further enhance the valorization processes. Evaluation of the entire situation (external and internal input) will shape the language behavior output. This model is depicted in Figure 2.

This model is dynamic in the sense that the child's language behavior output will in turn provoke a new input from the environment. Each new input will add to the child's experience and play a role in further shaping such mechanisms as his representations, his belief system and his social identity. The valorization of the language behavior comes from three sources: the external input, the personal experience and the feedback mechanisms. When language is used successfully for a communicative function it will be valorized for this function; the child will be more motivated to use it in this function, which will in turn lead to an even greater valorization and an increase in the communicative competence. The same mechanism operates at the cognitive level: if language is valorized as a cognitive tool or as an object of cognitive analysis, it will be more valorized in this function; this further valorization will in turn enhance its use in these functions.

A MODEL OF BILINGUAL DEVELOPMENT

The development of bilinguality involves the acquisition of two (or more) linguistic codes perceived as socially distinct by the linguistic community. This acquisition is either simultaneous or consecutive. We will not refer to the development of bilinguality after childhood because we are interested in the role played by a bilingual experience in the overall development of the child. To what extent is the child's development affected by exposure to two languages and by the relation between them?
More specifically, we ask the following questions:

How does form-function mapping occur when the linguistic input contains two linguistic systems?

To what extent is it important that both languages are used for both the communicative and the cognitive function?

How does the relative valorization of the two languages affect the child's language development?
To what extent are the child’s social psychological processes affected by this experience?
To what extent are the different language behavior competencies affected by the bilingual experience?
To what extent is the child’s cognitive development affected by the bilingual experience?

To answer these questions, we will apply this general model of language development to the development of bilinguality.

From the empirical data available on simultaneous bilingual development, it appears that children are not only capable of switching from one set of linguistic rules to another, in a socially appropriate manner, at an early stage of language development and long before they have mastered all the rules of adult language; they are also aware of the existence of two distinct codes. An infant bilingual spontaneously translates for two adults each of whom speaks one of his languages, thus establishing equivalencies between his two languages. The ability to use either code for similar interactions is proof that the child is capable of equating the interactional rules of his two languages before he has acquired adult-like language competence and is aware of at least certain dimensions of the social context of language use.

All societies value language as a tool of communication and cognition; however, they tend to valorize certain functions more than others, for example, the cognitive function. If different varieties of language are present in the society, one variety may be valued to the detriment of others. A similar situation obtains in the case of multilingual societies. One or more languages may be highly valued, whereas others may be devalorized. At the individual level, a similar mechanism operates. To the extent that the adults around the child value the use of language for certain functions, he will also value the use of language for these functions and thus develop these aspects.

In addition to the processing mechanisms described for the monolingual development, several important dimensions will determine the type of bilinguality that a child will develop:

1. the relation between the two languages, between their statuses, their valorization, and their use for functions, both at the societal and at the individual level;
2. the degree to which form-function mapping overlaps for the two languages;
3. the time of onset of bilinguality (i.e., whether it is simultaneous or consecutive);
4. the degree of internalization of the relative values of the languages and of the mappings;
5. the degree to which each language contributes to the development of the communicative, cognitive, and metalinguistic competencies;
6. the volume of exposure in both language;
7. the valorization of the contacts in the child’s network; and
8. the quality of the exposure, for instance literate language and literacy resources.
The roots of bilingual development are to be found in the interpersonal interactions occurring in the child’s social environment, which provide the child with a model of language behavior comprising more than one language. The relative status, valorization, and use of the two languages in the society and around the child will determine how far the child will internalize the two languages as equivalent and interchangeable, or as having different values in terms of social prestige and tools for communicating and thinking.

The degree to which form-function mapping (fFm) overlaps will determine how far the child will have to perform a double mapping, that is (fFm): (La/form—function—(Lb/form), or can make a simple (fFm): (La/form—function or (Lb/form—function mapping. Some functions of language, such as agent and action, are universal and therefore are shared by all languages. For these functions, the child must internalize the mapping of one function with two forms. If, furthermore, the two languages are used for the same social and cognitive functions, one function–two forms mapping will also occur. If, however, one language is used for certain functions only and the other for complementary functions, the child will have to produce form-function mapping in the same way as the monolingual child, as is the case in an ideally diglossic situation.

The time of onset of bilinguality, that is, whether it is simultaneous or consecutive will have an effect. In the case of simultaneous bilinguality, language socialization occurs with two languages present. The child must at the same time learn that two linguistic systems can serve the same social function and that one appropriate social response can be served by two distinct linguistic forms. Development of perceptual skills and discrimination of the two linguistic systems in the social environment is an important prerequisite for the bilingual child’s development. The child maps two forms onto one function at more or less the same time and in a more or less compound way (fFm), whereas in the case of consecutive bilinguality, the child acquires form-function mapping (fFm) first in one language and will later map a new form onto this already existing form-function mapping (fFm). In the case of simultaneous bilinguality, the child is likely to acquire more compound mappings, whereas in the case of consecutive bilinguality, it is more likely that a new form mapping will be added to an already existing form-function mapping. This is true as far as the semiotic-linguistic functions are concerned. In each case, the task is cognitively different. This is depicted in Figure 3.

The child will internalize the social, cognitive, and semiotic aspects of language. The kinds of norms, values, and language model to which the child is exposed and which he will internalize depend on (a) whether there is one or more functional and formal model(s) of language around the child; (b) whether his network is homogeneous or heterogeneous, that is, all its members have a similar language
behavior or some members have a different language behavior from others; and (c) whether there are competing values and norms. The degree of internalization of the values and of the form-function mapping will determine how far the child will attribute certain values to certain form-function mappings in one or in both languages, and will thus be motivated to use a particular type of form-function mapping in one or both languages.

The degree to which each language is valorized is important for the development of the communicative, cognitive, and metalinguistic skills. At the individual level, the positive valorization of all or some of the values linked to the formal and functional aspects of language will help to elaborate and trigger off a motivational process for learning and using those aspects of language. To the extent that these skills are developed, the child will elaborate his representation of language that will include the relative use of the two languages for the various functions.

As we suggested in Hamers and Blanc (1982), the use of language as a cognitive organizer is developed by the bilingual child at three different levels: two levels specific to each language and one abstract level common to both languages. Language is stored in the form of propositional representations, that is, as relational categorizations; we further argued that propositional representations are related to the general characteristics of language and independent from the specificity of a given language. We therefore propose that the bilingual has propositional representations that are common to both his languages and that he uses this common pool in organizing knowledge. (Cummins’s [1981] model of “common underlying proficiency,” also suggests that the bilingual develops a literacy-related proficiency common to both languages and that the two languages are interdependent at deeper levels of processing.)

When a bilingual child has well-developed propositional representations, his organization of knowledge will be independent of the specific characteristics of his languages and it is likely that he will be able to use his two languages interchangeably to communicate this knowledge. On the other hand, if a child has not learned to use language as a
cognitive organizer to a significant extent, introducing him to a second language will not promote this function. Thus, the development of propositional representations and the ability to use language as a cognitive organizer must be viewed as psycholinguistic processes that are independent of the specific characteristics of the languages. What the bilingual child develops are general cognitive mechanisms of information processing; once these mechanisms have been set in motion, the child is able to apply them to all information-processing tasks, even to nonlinguistic ones.

Bilingual experience may, however, interact with these psycholinguistic processes and its outcome will vary from one case to the other.

**CASE STUDIES:**
**TYPES OF BILINGUALITY**

We will now examine a number of typical cases to illustrate how these factors determine the outcome of bilinguality.

**CASES OF SIMULTANEOUS BILINGUALITY**

In the case of simultaneous bilinguality the child is not only exposed to two languages $L_A$ and $L_B$ during the language development years but the two languages are used with the child in the socialization process from birth onwards.

Case 1: The two languages $L_A$ and $L_B$ are learned simultaneously and developed equally for the same functions including the literacy functions.

A typical case is that of children born into mixed-lingual families where both parents have similar interactions with the child and where language is used for metalinguistic and literacy-related activities (see for example, Leopold, 1939-1949; and Ronjat, 1913). Thus, the child is exposed to a complete model of language behavior using two languages. The child internalizes both languages that are equally valorized for communicative and cognitive functions in his environment. Because there is a compound mapping between two linguistic forms and all functions, the child can equate the two forms as corresponding to one function and therefore as being interchangeable. He may therefore develop a pool or system common to both languages. Thus, the child develops an early metalinguistic awareness that will generalize to other areas of concept learning. The use of two languages instead of one for the same functions will generally induce the child to develop an increased capacity for abstraction. The child's linguistic environment may be considered as enriched when compared to a monolingual environment. As all functions are developed, the child will benefit maxi-
mally from this enriched environment and he will develop not only a balanced but also an additive form of bilinguality. This will happen for example in the case of a mixed-language family, where both parents are highly educated and both function at all levels in their language with an exposure to literate sources in both languages as is the case in the Ronjat family, where the father used French and the mother used German for all interactions with the child. It must also be noted that the use of literacy-related items in the home-language are of the uttermost importance to attain a balanced form of additive bilinguality in immigrant families. For example, in Canadian families from Greek origin, the children born in Quebec are more likely to become balanced bilinguals (French-Greek or English-Greek) or balanced trilinguals (French-English-Greek) if literacy-related items, such as books, newspapers, recordings, the writing of letters are used in both or all three languages. The use of literacy-related materials seem to have a greater incidence on the maintenance of the home language than participating in social gatherings or attending outside curriculum language classes (Gibbons & Ramirez, in press; Hamers, 1994).

Case 2: The two languages $L_A$ and $L_B$ are learned simultaneously and developed equally for the same functions but no literacy functions are present.

This is the case when the child is born into a low-literate bilingual family where each parent speaks one language, where both parents have similar interactions with the child, but where only the communicative functions are valorized in the family, to the exclusion of the cognitive literacy-related ones. The child is exposed to a language behavior model in which two linguistic systems are used mainly for communicative functions. The child will thus not valorize the cognitive functions. If at a later stage, for instance at school, the child develops the cognitive functions in one language, he will be faced with the same difficulties as the monolingual child who has to learn these functions in the mother tongue at school. Both have to develop a new simple mapping between known forms and new functions. However, because for the bilingual child the two languages are interchangeable, he should have no major difficulties in transferring his cognitive skills from one language to another once these have been acquired through the school language. Any difficulties that he might encounter cannot be attributed to his bilinguality, but to the absence of cognitive functions in his environment. We have here a neutral form of bilinguality. This will be the case of a mixed-language family composed of low-literate parents and a lack of exposure to literate materials in both languages. For example, in a mixed-language family formed by a little-educated Wendake-Indian father and a little-educated French-Canadian mother living in Quebec City, the child was perfectly bilingual in Cree and French, but for social communication only. The child had to rely on
the school for the acquisition of literacy in French. The school results of
this child are similar to that of a monolingual French child from a low
literate background.

Case 3: Two languages $L_A$ and $L_B$ are learned simultaneously, but one is
used for communicative functions only and the other one for all func-
tions.

A typical example would be that of a child whose parents speak the
same language and a caretaker another language; one language is
learned for all functions and the other learned for a restricted num-
ber of functions. For example, a French-Canadian family who has a
Spanish-speaking caretaker from birth onwards and throughout child-
hood is likely to learn Spanish in addition to French, but for social
interactions only. This is also the case in many African countries where
families use both their endogenous language and the former colonial
prestigious exogenous language but for different purposes. Both lan-
guages are valorized for the child, but the language that serves the cog-
nitive functions will be relatively more valorized. Through the inter-
nalization process, the child will valorize both languages to a different
extent and be motivated to use them for the functions that are valo-
ized. The tendency will be to develop a form of bilinguality dominant
in the more valorized language. Compound mapping will occur
between the two linguistic forms and those functions that are valorized
in both languages. For the functions valorized in only one language, a
single mapping will occur. However, as the child masters both lan-
guages, it is likely that transfer of form-function mapping will occur.
He will however not have the same advantages on the metalinguistic
level, as compound mapping will occur for communicative functions
and not for cognitive functions. For example, in the case of Benin, it
was found that the Fon-speaking children, schooled in French in the
Cotonou area, were likely to valorize both French and Fon for the func-
tions for which they were used. A fairly large number of children were
also able to transfer their cognitive functioning, learned in French only,
to the Fon language although they did not valorize Fon for these func-
tions (Da Silveira & Hamers, 1990). Although the cognitive-linguistic
dimension of language behavior might be more developed than in the
previous case, the advantages of bilinguality will be less evident than
in Case 1.

In all three cases, there is no disadvantage attributable to bilin-
guality. The child develops native competence in two mother tongues.
The bilingual development turns out to be to the child’s advantage in
cognitive functioning, especially when the two languages are used for
all functions. These are the cases that have been labeled additive
bilinguality (Lambert, 1974). It is understood that if an adequate lan-
guage behavior model is lacking in the child’s socialization process,
the child will not be able to internalize language behavior and develop
the necessary form-function mappings required for language development. This happens, for example, when immigrant parents give up their mother tongue in their socialization practices and replace it by a socially more prestigious but little mastered second language used for a limited number of functions.

CASES OF EARLY CONSECUTIVE BILINGUALITY

In the cases of early consecutive bilinguality, one language $L_1$ is acquired as the mother tongue and a second language $L_2$ is introduced later, after the years of language development but during childhood (before the age of 8-10), either as a language used in the neighborhood or a language of schooling.

Case 4: The two languages $L_1$ and $L_2$ are learned consecutively, all functions are developed first in $L_1$ and later in $L_2$, and both languages are valorized in the child’s social networks.

In this case, the child will first develop all functions in his first language: thus, a simple (fFm) mapping will occur and language will be valorized for all functions. After being introduced to a second language, the child, after a while, will develop the second language for all functions. Because he already possesses the necessary (fFm) mappings with his $L_1$, he will easily map a new form onto an already existing function. As both languages are highly valorized for all functions, he will internalize these social values for both languages. This is the case of a child using a socially highly valorized language at home and being schooled in a different language, which is valorized for the literacy-related cognitive functions and possibly valorized as the language of the peer group. The child may develop an additive balanced form of bilinguality similar to the child in Case 1; or the child may remain dominant in his first language and develop a near-native command in the second language. This would, for example, be the case of the English-Canadian middle class children in the Canadian French-immersion programs.

Case 5: The two languages $L_1$ and $L_2$ are learned consecutively, but the child has not developed the literacy-related functions in the devalorized $L_1$ before he starts to learn $L_2$, which is the valorized language in society.

When $L_1$ is devalorized in the society, as is the case for many ethno-linguistic minorities, and the child has not developed the literacy-related functions in his $L_1$, the introduction to a new language at the same time as the introduction of new literacy-related functions will present the child with a supplementary mapping problem because both form and function are new. This is the case of submersion schooling in the majority language, as for example, when a Spanish Ameri-
can child is schooled through an English only program. If the conditions do not permit the child to valorize his L₁ sufficiently as compared to his L₂, he will not be able to use his L₁ for new literacy-related functions when he starts acquiring them, because he can only rely on his limited knowledge of L₂. He will try to use an underdeveloped L₂ to learn new functions. In this case, acquiring new language functions as well as a new language without the support that comes from the valorization process for the first language, might be too difficult a task for the child. It is therefore primarily a lack of development of the literacy-related functions via L₁ that leads to a lack of development of language as a cognitive tool. In this case, the outcome of the bilingual experience is likely to be a subtractive form of bilinguality.

This is not however an inevitable outcome: provided that the first language is sufficiently valorized with the child for literacy-related functions, and the child can develop these in his first language, he will have less difficulty to map new L₂ forms on these functions. Not only the use of L₁ must be encouraged but also the development of the literacy-related functions in the L₁ in the family environment. This is documented, by numerous examples of minority children schooled totally or partially through their mother tongue, or in the cases where the home-language is maintained in the family (for a review of several of these cases, see Hamers & Blanc, 2000, pp. 340-350). In the case of minorities (indigenous or immigrant), the maintenance of the home-language through bilingual education, that is the use of the mother tongue as a tool of cognitive functioning, seems a crucial factor in the attainment of academic results. For example, in the case of the two-way bilingual education programs, a 6-year longitudinal study in the Boston area, working class children from White, Black, or immigrant background obtained better academic results than their peers in English-only programs (Lambert, 2003).

Case 6: The two languages are learned consecutively, but L₁ is used for a greater number of functions than L₂.

This case is similar to Case 3. It might occur, for example, when a child has learned his highly valorized L₁ for all functions, including literacy-related ones, and receives his schooling via an L₂ without having many contacts with people that speak that language. There will be neither positive nor negative consequences from his bilingual experience, but he is likely to remain dominant in L₁.

CASES OF LANGUAGE SHIFT

In some cases of bilingual development a language shift might occur in the sense that a language present in early development might disappear or become atrophied.
Case 7: The two languages are learned consecutively or simultaneously, and the least valorized language (L1 or L2) will disappear or become atrophied after the child has developed the literacy-related functions in the devalorized L1 or in both languages, before he starts schooling in L2, which is the valorized language in society.

In this case, the child will develop all functions but will become dominant in L2, which is even likely to become his most functional language. The degree of bilingual competence will depend on the degree of attrition of the least valorized language. For example, if the first language is no longer spoken, or only used to a limited extent, the child may even, in an extreme case, become monolingual. However, because the cognitive aspects of language were already in place before the language shift occurred, the outcome will be a neutral dominant form of bilinguality. This is, for example, the case when a 10-year-old Cantonese-speaking immigrant moves to the United States; if the family decides to give up Cantonese and adopt English as the home-language, the child is likely to become dominant in English. A younger 6-year-old sibling might even become monolingual in English.

Case 8: The two languages are learned consecutively or simultaneously, and the least valorized language (L1 or L2) will disappear or become atrophied before the child has developed the literacy-related functions.

In this case the child will be in a similar situation as in Case 5. That is, he will not only, suffer some disadvantage to his cognitive development, but, in addition, he is more likely to become monolingual in the dominant language. This is often the case when immigrant families adopt the more prestigious language of the host country, often without having acquired a sufficient competence in that language; in this case, the younger children are likely to loose their mother tongue. Children who immigrated at a very young age, whose family adopted the language of the host-country as home-language, and who are schooled through the dominant language are likely to become monolingual in the dominant language. For example, a 4-year-old in the Cantonese family will almost certainly become a monolingual English-speaking adult.

As already mentioned, the source of language development is to be found in the social environment; if it cannot provide the adequate form-function mappings, the child will not be able to develop them. Because, in the case of shift in the family language, there might be a lack of an adequate model and we might have a case of subtractive bilinguality, in which the second language will tend to replace the first language.

To summarize, the distinction between additive and subtractive bilinguality must be considered on this continuum, which is the resultant of two dimensions. This continuum is depicted in Figure 4.
The first dimension deals with the cognitive function of language, more specifically with the ability to analyze language and control linguistic cues. The second dimension refers to the degree of valorization that the child attributes to language. This valorization results from the child’s internalization of social values attributed to the languages in the community and the surrounding networks. At the additive end of...
the continuum the cognitive function of language is well developed and both languages are highly valorized. Because the child valorizes both languages to the same extent, he will perceive them as interchangeable. This perception will in turn enhance the overall cognitive functioning. At the other end, a child, who in the first place did not develop the cognitive literacy-oriented language skills in his first devalued language, and, who, at the same time is required to develop these skills do so in a socially more valorized language of which he has little or no knowledge, is likely to develop a subtractive form of bilinguality (Hamers, 1991, 1997). The sociocultural and cognitive dimensions of the additive-subtractive continuum is schematized in the identification of all the conditions that are favorable to an additive form of bilinguality is still a long way off and raises a number of questions. To what extent is the child's perception of these social factors more important than the factors themselves? To what extent can an additive form of bilinguality develop in a subtractive context? In other words, how determining is the sociocultural context for the outcome of bilinguality and how far can the individual develop strategies and social psychological mechanisms that can modify the influence of the social context? The causal link between social psychological roots of bilinguality and their cognitive outcome is still little known. Not all the environmental factors that enable the child to reach the competence necessary for developing additive bilinguality have been identified. In other words, to have a better understanding of the development of bilinguality, we must view it in relation to language valorization in the social networks and in relation to the development of literacy.

Why is it that in a subtractive situation, the bilingual child is less successful at cognitive tasks than his monolingual peer who also lacks these cognitive skills? First, because of the low value attached by society to his L1, it will be more difficult for this child to see the two languages as interchangeable and therefore to use them for socially valorized activities. Secondly, schooling will reinforce this perception by introducing him to cognitive tasks exclusively in the majority language; he might then perceive the L2 as the only language suitable for cognitive functioning. Thirdly, whereas in language development, it seems necessary for the child to develop a function before he can acquire the linguistic form to express it, the child is here required to learn new forms of language for a language function he has not yet developed.

**CONCLUSION**

In this article, we put forward a social cognitive interactional model of bilingual development. We analyzed a number of hypothetical case studies to illustrate the main types of bilinguality that may develop.
Language development takes place in the interpersonal interactions that are embedded in social networks and wider social structures. It starts with language socialization through which the child internalizes the social values of his environment and language behavior used around and with him. Through this internalization process, he will valorize all or only some of the functions of language and will be motivated to learn and use language for all or some of the functions. This leads to the development, on the hand, of communicative linguistic competence, and on the other, of conceptual linguistic competence. These processes result in language output. One essential feature of this model is the feedback mechanism operating between the different processes involved in the language behavior. These processes are also influenced by the child’s past experience.

Each level of processing (internalization, valorization, motivation, competence) is established through a form-function mapping. It should be understood that we view the developing structures in a connectionist approach—that is, as an organized assembly of connections established through experience.

When two languages are present in the child’s environment, either a new set of complex compound form-function mapping occurs: fL₁fL₂F in which two linguistic forms are linked to one function; or, a new form in L₂ is mapped onto an existing fL₁F, thus producing fL₂fL₁F. In the case of simultaneous bilingualism, both languages are interchangeable for the same functions. In the case of consecutive bilingualism, mapping between form and function is first established in one language and a new form is acquired to fulfill the same function. In this case, it is necessary and sufficient that L₁ be used for both the communicative and the cognitive functions to establish a new mapping between the function and the L₂ form.

If, in the case of simultaneous bilingualism, both languages are valorized for all present functions, this is sufficient for the adequate mapping to occur between a function and both the languages; if, however, only some of the functions are present, mapping will not take place, as in the case of a monolingual child. If, in the case of consecutive bilingualism, only some of the functions are present, mapping will be established between these function and the L₁ forms. It will be relatively easy to map new L₂ forms on established fL₁F mapping’s. But if no fL₁F mapping’s exist mapping a new L₂ form onto a new function F is a more complex task. This has important implications for the education of bilingual children. Furthermore, this model can explain why different bilingual experiences have different developmental outcomes.

NOTES

1. This model is described at length in Hamers and Blanc (2000).
2. Individuals represent to themselves the outside world and their own actions and experiences. A representation is a stylised model of the world (Charniak & McDermott, 1985), which comes into existence through the individual's experience. This experience is partly unique to the individual and partly shared with others. Social representations are the sum of the knowledge shared by a community; they are systems of practices, ideas, attitudes, and values. Because all higher-order representations have a social component, the individual's organisation of complex human knowledge will depend to a great extent on social interaction and its two salient characteristics, culture and language (see Moscovici, 1981).

3. Through his interaction with others, the child first learns to organise his knowledge of interactional events. The representation of events or "schemata," also called "scripts" by Schank and Abelson (1977) and Nelson (1981) and "formats" by Bruner and Sherwood (1981), is derived from, and applied to, social contexts. A schemata or script is "an ordered sequence of actions appropriate to a particular spatial-temporal context, organised around a goal" (Nelson, 1981); it is, however, not episodic but serves as a generalised model valid for all instances of a class of events.

4. We refer to Tajfel's (1974) model of social identity, according to which the child is enabled through social psychological mechanisms such as social comparison, categorization, and distinctiveness, to build up his own social identity and to define himself as a member of the social group, distinct from others on value dimensions.

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