

Effects Of Neurological Bimodal Teaching Approach (NBTA) On Learner Motivation In The Learning Of English Language In County Public Secondary Schools In Kericho County, Kenya

John Bett

Mwangi Ndirangu

Department of Curriculum, Instruction and Educational Management, Egerton University, Kenya

Phylis Bartoo

Department of Literature, Language and Linguistics, Egerton University, Kenya

Abstract: In Kenya, English is the language of instruction in schools as well as one of the official languages. Despite this, the performance of students in the subject at the secondary school level has not been satisfactory. This may be attributed to traditional instructional methods used in the teaching of the subject. An effective instructional method is critical for learner motivation which leads to higher achievement scores in a subject of study. The Neurological Bimodal teaching approach which entails the use and adaptation of current knowledge about the functionality of the human brain to the teaching of a second language has been used elsewhere with promising results.

This study investigated the effects on learner motivation when Neurological Bimodal Teaching Approach is utilized in English language teaching and learning at the secondary school level. The study was guided by Danesi's (1987) Neurological Bimodal teaching approach to language acquisition. A quasi-experimental research design, the Solomon-Four-non-equivalent Group design was used. The study focused on creative composition writing. The target population for the study was 1080 Form Two secondary school learners. Purposive sampling was used to select the four schools for the study, all co-educational. An accessible population of 184 Form Two students was involved. Piloting of the instruments was carried out to find out the content validity of the items. The reliability coefficient of 0.7 and above was established for the instruments for acceptance. Data was analyzed using t-test, one-way ANOVA, ANCOVA, and Pearson correlation coefficient. The level of significance for acceptance and rejection of the hypothesis was determined at $\alpha = 0.05$. The findings of the study indicated that NBTA promoted learner motivation in English language learning more than did the conventional teaching approaches. The findings of the study may lead to well-informed decision making at all levels of education planning and development of the curriculum, instructional materials for language education; making decisions on the training of teachers; and making choices for classroom teaching activities and techniques.

Keywords: Neurological, Bimodal, R-mode, L-mode

I. INTRODUCTION

English is one of the languages that enjoy a wide global spread. Barski (2013) reports that according to a study conducted by the Summer Institute for Linguistics in 1999, 27% of the world population speaks the English language in more than 60 countries across the globe, making it one of the most widely spread languages on earth. Barski further observes that people doing business across the globe

communicate primarily in English. Manu (2011) states that the English language is the de facto national language of India, a country that is one of the most expansive and densely populated in the world. UNESCO (2010) lists twenty-four African countries as having adopted English as an official language.

The English language has played a central role in Kenya's social, political, economic and academic life since its introduction to the country by the British colonialists towards

the beginning of the 19th century. It has since been taught to Kenyan students at all levels of education as a second language. The Constitution of Kenya (2010) recognizes the English language as an official language in the country together with Kiswahili. The Kenya Institute of Education (KIE) syllabus (2002) documents English language as one of the three compulsory subjects taught and examined by the Kenya National Examination Council (KNEC) at both primary and secondary schools. All subjects in the Kenyan curriculum, except Kiswahili, are taught in English language. It is not in doubt, therefore, that performance in other subjects can be negatively or positively affected by a student's mastery of the English language. Consequently, a good achievement in the English language may positively affect achievement in other subjects. At both the national and local levels in Kenya, achievement in the English language, like in the other two compulsory subjects (Mathematics and Kiswahili), is of key interest to the government as well as to other stakeholders, including educationists and linguists. In the Kenyan school curriculum, the importance of English language is demonstrated by the numerous goals of teaching the subject (KIE, 2002)

Although the English language is an important subject, many students do not perform satisfactorily well in it in national examinations in Kenya. Various reports by the Kenya National Examination Council (KNEC) on the performance of candidates in the English language paper up to as late as the year 2014 indicate unsatisfactory achievement by learners. A KNEC (2015) report shows unsatisfactory performance in the language with a pass rate of 77.68 (38.84%).

Any attempt to bring about a positive turn around on learner performance would be welcome since traditional methodologies of teaching the English language have not produced satisfactory results. Danesi's (1987) Neurological Bimodal teaching approach (NBTA) is one of the new methods of teaching which has been refined from extensive scientific research on human behaviour and learning. It is a teaching method which appeals to both brain hemispheres of the learner for wholesome and effective language learning.

Nuessel and Cicogna (1991) note that since the 1980s, researchers on second-language instruction have increasingly advocated for the employment of multi-channeled sensory stimulation to assist in its pedagogical objectives. Danesi (1987) observes that there are two hemispheres in a man's brain: the right and the left hemispheres. The two serve differentiated functions. He describes the hemispheres as L-Mode, to refer to the left hemisphere; and R-Mode for the right hemisphere - thus, Danesi's 'Bimodal Model'. This is generally referred to as Brain Based Learning (BBL). Caine and Caine (1994) describe Brain Based Learning (BBL) as involving accepting the rules of how the brain processes information, and then organizing instruction bearing these rules in mind to achieve meaningful learning. One particular aspect of NBTA, the ludric techniques, involves any game-playing or problem-solving techniques including crosswords, word searches, scrambled words, interactive games, board games, etc (Danesi, 2003). Caine and Caine (1994) have noted that one vital aspect of Danesi's bimodal model of second-

language acquisition is the incorporation of instructional activities and strategies in the language classroom that access and stimulate both hemispheres of the brain, thereby, complementing and reinforcing the acquisition of the target language. NBTA is more activity-based and more learner-centred than the conventional teaching approaches which tend to be more teacher-centred. These aspects of NBTA enhance learner motivation in language classes. Learner motivation is touted as a crucial component in language acquisition.

Dornyei (2001) observes that language teachers frequently use the term 'motivation' when they describe successful or unsuccessful learners. This reflects the intuitive belief that during the lengthy and often tedious process of mastering a foreign/second language (L2), the learner's enthusiasm, commitment and persistence are key determinants of success or failure. Indeed, Dornyei further argues, in the vast majority of cases that learners with sufficient motivation can achieve a working knowledge of an L2 regardless of their language aptitude. However, without sufficient motivation, even the brightest learners are unlikely to persist long enough to attain any really useful language. A student's attitude and motivation have frequently been reported to be the most critical factors for success (Desmarais, 2002; Doherty, 2002; Gilbert, 2001; Murday & Ushida, 2002; Warschauer, 1996). Motivation, according to Winne and Marx (1989), is both a condition for, and a result of, effective instruction.

Dornyei adds that a "motivated learner" is, therefore, defined as one who is: (a) eager to learn the language, (b) willing to expend effort on the learning activity, and (c) willing to sustain the learning activity (Gardner, 2000). Motivation plays a significant role in three ways. First, it mediates any relationship between language attitudes and language achievement. Second, it has a causal relationship with language anxiety. Third, it has a direct role in the informal learning context, showing the voluntary nature of the motivated learners' participation in informal L2 learning contexts.

Kumaravadivelu (2003) argues that making learning an enjoyable experience is crucial to maintaining learners' motivation. This involves the application of various principles related to motivation when preparing a teaching plan for a semester or similar period. First, texts, audiovisual materials, tasks, and class activities should be related to students' interests. Second, the teacher should always give learners choices in assigning a task, and learners' preferences should get priority. Third, an extracurricular component in the course is a very desirable feature so that elements such as music and humor can be incorporated in teaching, thus increasing learning opportunities beyond regular lessons. These extracurricular activities can be simple speaking and writing acts such as sharing a cultural object from one's country/region, giving a musical or dramatic performance, and having poster competitions. These activities have been tried and found to be quite successful in enhancing and maintaining learners' motivation (Kumaravadivelu, 2003). Furthermore, it is important to appreciate learners' efforts and progress. To promote learner autonomy, activities that involve peer support and feedback are incorporate in addition to teacher commentary. The use of interesting icebreakers can help in overcoming classroom drudgery. For this purpose, cartoons

and brief video clips related to the lesson are used. Moreover, sometimes changing the class venue to an open space or a corner in the school cafe can help break monotony, especially when a lesson does not require use of classroom equipment. Learners' motivation may be manifested in their interest, commitment to tasks and enthusiasm during classroom processes.

Learner achievement in English language in the study area has persistently been below average. This study sought to determine the effect on learner achievement in English language when NBTA is used in the teaching of the language.

II. METHODOLOGY

The study adopted the quasi-experimental research design, Solomon Four, non-equivalent control group design. A pre-test to determine the entry level of the respondents before the experiment was carried out. The study was conducted in Roret Division of Bureti Sub-county of Kericho County of Kenya.

The target population was 1080 Form two learners in the Division. The accessible population was 184 Form Two learners from the four experimental schools of the study. Simple random sampling technique was used to sample 184 Form Two learners, for the experiment, from the target population of 1080 Form Two learners in the Division. The teachers who participated in the study had a minimum qualification of a diploma in education with a teaching experience of three years or more.

The study utilized the Students' Motivation Questionnaire (SMQ) and the English Language Writing Achievement Test (ELWAT) for data collection. Expert judgment was used to validate the research instruments. Pilot testing of the instruments was carried out in two schools in Bureti sub-county. The reliability of the written tests was measured by calculating the reliability of the marking. This was done in several ways, including inter-rater and intra-rater reliability. Inter-rater reliability refers to the degree of similarity between different examiners - if two or more examiners, without influencing one another can give the same marks to the same set of scripts (Wang, 2009). To estimate the reliability of the SMQ, Cronbach Alpha coefficient was used. The coefficient was .839, suggesting that the items had relatively high internal consistency. An instructional module for teachers' to be used in the experimental schools was developed and the teachers trained for two weeks on its use before it was implemented.

A. DATA ANALYSIS

The hypothesis of the study sought to determine if there was any statistically significant difference in motivation between learners taught English using NBTA and those taught using the traditional methods of teaching. Descriptive and inferential statistics were also be used to analyze data. The mean and standard deviation was used to describe and compare students' motivation and achievement in English language from the experimental and control groups. The hypothesis was tested for significance using t-test, ANOVA, and ANCOVA. The post-test results were correlated with the

covariate using KCPE results. The level of significance was set at $\alpha = 0.05$ to guide in the rejection or acceptance of the null hypothesis.

III. RESULTS AND DISCUSSION

In order to determine the effect of NBTA approach on students' motivation to learn English language composition writing, T-test, ANOVA test, Scheffe Post hoc analysis, ANCOVA test and gain analysis test were utilized in the examination of this hypothesis. A pretest analysis was the first step in addressing the hypothesis of the study. The results of the pretest analysis are shown on Table 1.

Scale	Groups	N	Mean	SD	df	t-value	p-value
Motivation	E1	42	2.88	0.20	87	0.550	0.584
	C1	47	2.90	0.25			

Table 1: Pretest Mean Scores on Motivation

The results on Table 1 show that the difference between the mean score ($M = 2.90$, $SD = 0.25$) of C1 on motivation was higher than that of E1 ($M = 2.88$, $SD = 0.20$). The difference between the motivation scores were however not statistically significant at the 0.05 level, $t(87) = 0.550$, $p > 0.05$. The results are an indication that the two groups C1 and E1 were similar on achievement and motivation to learn English before commencement of the study.

Using the instructional module, treatment of the experimental groups was conducted for five weeks before the administration of questionnaires to establish learners' post test motivation. In order to compare the motivation on SMQ for E1 and C1 by learning approach, their post motivation mean scores were computed. The results were as shown on Table 2.

Group	N	Mean	SD
E1	42	4.24	.47
C1	47	3.25	.25

Table 2: Posttest motivation mean scores and SD of E1 and C1 groups

On Table 2, the results show that there was a marked difference in post motivation mean scores between the experimental group E1 ($M = 4.24$, $SD = 0.47$) and the control group C1 ($M = 3.25$, $SD = 0.25$). These findings suggest that Neurological Bimodal Teaching approach motivated learners much more significantly than the conventional teaching approaches since the mean score for E1 (4.24) was higher than that of C1 (3.25).

To find out if there were any statistically significant differences in post-test motivation mean scores between E1 and C1, one way ANOVA test was carried out and the results were as presented on Table 3.

Scale	Sum of Squares	df	Mean Square	F	p-value
Between Groups	41.169	3	13.723	115.000	.000*
Within Groups	20.644	173	.119		
Total	61.813	176			

*Significant at $\alpha=0.05$ significance level ($p < 0.05$)

Table 3: Comparison of Posttest Motivation Scores by Learning Approach using ANOVA

Table 3 shows that the results of post-test SMQ mean scores for E1 and C1 were found to be statistically significantly different since $F(3, 173) = 115.000, p < 0.05$. The ANOVA results on Table 3 show that there was a statistically significant difference in motivation between learners taught English language using Neurological Bimodal Teaching approach and those taught using the conventional approaches. This implied that NBTA promoted motivation among learners more than did the conventional teaching approaches.

The ANOVA results on Table 3 did not show where the difference lay. Therefore, the Scheffe post-hoc multiple comparisons test on SMQ mean scores was run to determine where the differences occurred between groups E1 and C1. The results of the Scheffe post hoc multiple comparisons were as presented on Table 4.

Groups	Mean Difference	p-value
E1 vs E2	0.088	0.643
E1 vs C1	0.993	0.000*
E1 vs C2	1.110	0.000*
E2 vs C1	0.904	0.000*
E2 vs C2	1.022	0.000*
C1 vs C2	1.118	0.427

*Significant at $\alpha=0.05$ significance level ($p < 0.05$)

Table 4: Multiple Comparisons of SMQ Post-test Means by Learning Approach

Table 4 shows the post hoc comparisons of the post-test motivation mean scores of the SMQ for the four groups. From the Table, it can be observed that the difference in posttest motivation mean scores between the experimental groups E1 and E2 was not statistically significant ($MD=0.088, p > 0.05$) but the posttest motivation mean difference between E1 and C1 ($MD=0.0993, p < 0.05$); E1 and C2 ($MD=1.110, p < 0.05$) as well as the post motivation mean difference between E2 and C1 ($MD=0.904, p < 0.05$), and E2 and C2 ($MD=1.022, p < 0.05$) showed statistically significant difference. On the other hand, the post motivation mean difference between control groups C1 and C2 ($MD=1.118, p > 0.05$) showed no statistically significant difference. Therefore, the findings indicated that the experimental groups E1 and E2 benefited from NBTA while the control groups C1 and C2 did not benefit as much from the conventional teaching approaches. This proved the superiority of NBTA approach over the conventional teaching approaches.

It was important that all the four groups participating in the study had to be similar at the point of entry into the study. Since the research design only allows the pre-testing of E1 and C1, the ANOVA test on Table 3 does not control for entry behaviour differences. A tool that could deal with entry behaviour difference was therefore necessary (Mugenda & Mugenda, 1999). The ANCOVA test was subsequently carried out with KCPE as a covariate. In ANCOVA test, a covariate is used to address any entry level differences. Table 5 indicates the adjusted means of the four groups of the study.

Groups	Mean Difference	p-value
E1 vs E2	0.103	0.134
E1 vs C1	0.961	0.000*
E1 vs C2	1.090	0.000*
E2 vs C1	0.858	0.000*
E2 vs C2	0.987	0.000*

C1 vs C2	0.129	0.069
----------	-------	-------

*Significant at $\alpha=0.05$ significance level ($p < 0.05$)

Table 5: Adjusted SMQ Posttest Motivation Mean Scores Using ANCOVA Test

The ANCOVA results on Table 5 confirmed the post hoc comparison results on Table 4. On Table 5, the experimental groups E1 and E2 showed no statistically significant difference in post motivation means ($MD=0.103, p > 0.05$); and there was a statistically significant difference in all cases between E1 vs C1 and E1 vs C2 as well between E2 vs C1 and E2 vs C2. But there was no statistically significant difference between C1 and C2 ($MD=0.129, p > 0.05$). Therefore, the pair wise comparison for the groups revealed statistically significant difference in motivation between the experimental and the control groups. The ANCOVA results corroborated the finding that Neurological Bimodal Teaching approach led to better language achievement among learners through increased motivation. On the other hand, the conventional teaching methodology did not promote statistically higher motivation for the control groups, suggesting that it is better to utilize NBTA in the teaching of English language composition writing.

In order to determine the effect of NBTA on students' motivation by learning approach, the pretest and post-test mean scores on SMQ for E1 and C1 were compared to establish the mean gain difference between the two groups. The results were as presented on Table 6.

Scale	Groups	N	Mean	SD	df	t-value	p-value
Motivation Gain	E1	42	1.34	0.608	87	9.706	0.000*
	C1	47	0.34	0.34	63.049	9.424	0.000*

*Significant at $\alpha=0.05$ significance level ($p < 0.05$)

Table 6: Results of Posttest Motivation Mean Gain by Learning Approach

Table 6 shows the motivation mean score gain of the experimental groups E1 and control group C1. From the Table, the results showed that the difference between the experimental group E1 ($M = 34, SD = 0.608$) on posttest motivation mean score gain and that of the control group C1 ($M = 0.34, SD = 0.34$) was statistically significant at the 0.05 level, $t(87) = 9.706, p < 0.05$. The findings suggested that Neurological Bimodal teaching approach was a better teaching approach than the conventional teaching approaches since increased motivation among learners may lead to improved achievement in English language composition writing.

To determine if there was any statistically significant difference in post-test motivation mean gain scores within and between groups, one-way ANOVA test was carried out and the results were as presented on Table 7.

Scale	Sum of Squares	df	Mean Square	F-value	p-value
Between Groups	23.071	1	23.071	106.747	.000*
Within Groups	18.803	87	.216		
Total	41.875	88			

*Significant at $\alpha=0.05$ significance level ($p < 0.05$)

Table 7: Comparison of Posttest Motivation Mean Gain Scores by Learning Approach using ANOVA

Table 7 shows that the results in post-test SMQ mean scores for E1 and C1 were found to be statistically significantly different $F(1, 87) = 106.747, p < 0.05$. The ANOVA results, therefore, indicated that there was a statistically significant difference in post motivation mean gain scores between learners taught using NBTA than those taught using conventional teaching approaches. Again, the superiority of NBTA over the conventional teaching approaches could be implied from these results, suggesting that instruction in English language composition writing would better be done using NBTA.

The findings indicated that there was a statistically significant difference in post motivation mean scores gain between learners taught using NBTA and those taught using conventional teaching approaches, leading to the rejection of the hypothesis of the study.

Caine and Caine (1994) have noted one vital aspect of Danesi's bimodal model of second-language acquisition is the incorporation of instructional activities and strategies in the language classroom that access and stimulate both hemispheres of the brain, thereby, complementing and reinforcing the acquisition of the target language.

Lo and Hyland (2007) undertook a study in Hong Kong which involved an action research project aimed at implementing a new ESL writing programme designed to enhance students' motivation and engagement by taking more account of the young learners' own socio-cultural contexts (which Neurological Bimodal Teaching approach refers to as contextualization). It was found that the new writing programme enhanced students' writing engagement and motivation. During this study, sentences were contextualized with adequate considerations for meaningfulness, and learners were also given a lee-way to determine the topics they would have liked to write their compositions on.

Serra (2014) found out that young learners write better about their own lives and experiences -whether it is a holiday, or their experience with their grandparents, or any other experience outside the classroom. Again, young writers write best when they write about something they know well. Neurological Bimodal teaching approach terms this as personalization and contextualization of learning to enhance learner motivation. In the instructional module, activities for personalization and contextualization of learning were incorporated in order to enhance learners' motivation.

Storch (2001) carried out a study involving 30 students on collaborative learning, which NBTA refers to as diversification of learning. After the study, 24% of the participants found the collaborative stage 'instructive' and 38% 'very instructive'. Storch (2001) points out that there are several potential advantages of collaborative learning: students become more confident and motivated as well as learn from each other. According to Helgesen (2004), visualization encourages learners to process the story through multiple sensory modalities: they think about what they see, hear and feel.

On the personalization of learning, Case (2008) found that students most need the motivation of realising that they can use English to talk about themselves. They are also most impressed by the teacher taking a personal interest in them. In the study, students were involved in using language games,

talking about student likes and wants, story books with personal connections, letting them undertake projects, photos and drawings or even jotting down what they say on the board or on a notebook. Their achievement scores increased significantly. The teaching module used during the present study included language games meant to motivate learners. The findings were, therefore, in line with Case (2008) study on personalization of language learning to enhance motivation.

IV. CONCLUSIONS AND RECOMMENDATIONS

NBTA increases learner motivation in the learning of the English language composition writing than does the conventional teaching approaches. After the treatment, the posttest mean scores on Students Motivation Questionnaire showed that the experimental groups outperformed the control groups.

Educators should concentrate on students' motivation as a more indirect influence on student outcomes. This can be achieved by implementing NBTA in the teaching of English language instead of utilizing the conventional teaching approaches which have always returned unsatisfactory results. NBTA enhances learner engagement since its features are more activity-oriented and it also employs multi-channeled sensory stimulation to assist in its pedagogical objectives.

REFERENCES

- [1] Barski, A. (2013). *Challenges of Learning English*. Retrieved on 6/9/15 from eHow Contributor @<http://www.ehow.com/>
- [2] Caine, R. N., & Caine, G. (1994). *Making connections: Teaching and the human brain*. New York: Addison-Wesley.
- [3] Case, A. (2008). Teacher Technique, Young Learners. Retrieved on 18.10.2015 from <http://edition.tefl.net/articles/teacher-technique/personalize-your-young-learner-classes/>
- [4] Cicogna, C. and Nuessel, F. (1991). Pedagogical Applications of the Bimodal Model of Learning through Visual and Auditory Stimuli, University of Louisville and Consulate General of Italy, Toronto. Retrieved on 18/5/15 @ <http://tell.fl.purdue.edu/>
- [5] Danesi, M. (1987). Practical applications of current brain research to the teaching of Italian. *Italica*, 64(3), 377-392.
- [6] Desmarais, L. (2002, March). *Monitoring distance training*. Paper presented at CALICO 2002, Davis, CA.
- [7] Doherty, K. M. (2002). Students speak out. *Education Week*, 11 (35), 19-23.
- [8] Dornyei, Z. (2001). New themes and approaches in second language motivation research. *Annual Review of Applied Linguistics*, 21, 43-59.
- [9] Gardner, R. C. (2000). Correlation, causation, motivation and second language acquisition. *Canadian Psychology*, 41, 1-24.
- [10] Gilbert, S. D. (2001). *How to be a successful online student*. New York: McGraw-Hill.

- [11] Helgesen, M. (2004). Mind's Eye. In Bamford, J. and R. Day. (eds.) *Extensive Reading Activities for Teaching Language*. Cambridge: Cambridge University Press.
- [12] Kenya Institute of Education (KIE) (2002). *Secondary Education Syllabus Volume 1*. Ministry of Education: Nairobi.
- [13] Kumaravadevelu, B. (2003). *Beyond methods: Macrostrategies for language teaching*. New Haven, CT: Yale University Press.
- [14] Lo J. & Hyland, F. (2007). Enhancing students' engagement and motivation in writing: The case of primary students in Hong Kong. *Journal of Second Language Writing* 16 (2007) 219–237
- [15] Mugenda, M.O. & Mugenda, A.G. (1999). *Research Methods: Quantitative and Qualitative Approaches*. Nairobi: ACTS Press.
- [16] Murday, K, & Ushida, E. (2002, March). *Student experiences in the language online project*. Paper presented at CALICO 2002, Davis, CA.
- [17] Nuessel, F. & Cicogna, C. (1991). Pedagogical Applications of the Bimodal Model of Learning through Visual and Auditory Stimuli, University of Louisville and Consulate General of Italy, Toronto. Downloaded 18/5/13 @ <http://tell.fl.purdue.edu/>
- [18] Serra, R. (2014). *How to help young English language learners love writing*. Downloaded on 18.10. 2015 form <http://www.britishcouncil.org/voices-magazine/how-help-young-english-language-learners-love-writing>.
- [19] Storch, N. (2001). How collaborative is pair work? ESL tertiary students composing in pairs. *Language Teaching Research*, 5, 29-53.
- [20] ROK (2010). The Constitution of Kenya. Nairobi: Government Printer. UNESCO (2010). Most spoken languages on earth. Downloaded on 31/12/13 from [mongabay@ http://news.mongabay.com/2005/0724-unesco.html](http://news.mongabay.com/2005/0724-unesco.html)
- [21] Wang, P. (2009). The Inter-rater Reliability in Scoring Composition. *Journal of English Language Teaching*, 2(3), 39-43
- [22] Warschauer, M. (1996b). Motivational aspects of using computers for writing and communication. In M. Warschauer (Ed.), *Telecollaboration in foreign language learning: Proceedings of the Hawai'i symposium* (Technical Report No. 12 pp. 29-46). Honolulu: University of Hawai'i Second Language Teaching and Curriculum Center.
- [23] Winne, P. H., & Marx, R. W. (1989). A cognitive-processing analysis of motivation within classroom tasks. In C. Ames & R. Ames (Eds.), *Research on motivation in education: Vol. 3. Goals and cognitions* (pp. 223-257). San Diego: Academic Press, Inc.