Multimodal language learning environments: Reading dynamic text

Using multimodal learning environments, subtitles and closed captioning are shown, via eye movements, to add to a learner's language experience. The poster presentation illustrates detailed attentional and reading patterns in video and written text environments for NS and NNS as further exploration of possible language learning tools.

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Framework:
A new interdisciplinary framework was created. Based upon the Jakobson (1960) Speech Event Model with six factors (addresser, addressee, context, message, contact & code) the

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Multimodal Multimedia Communication Event

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combines principles from:

+   "communication events" (referring to the integrated factors involved in communication, i.e. sociolinguistics, pragmatics, and linguistics) with

+   "multimodal events" (referring to interactions/presentations of information that involve more than one channel of information on a physical, sensory level such as aural and visual channels) and

+   "multimedia events"   (referring to the multimedia texts used in the presentation of information using semiotic qualities found in color, font size, layout, sound and video).

+   "literacy events"   (referring to the transaction that occurs between a text and a reader involving the reader's background)

The Multimodal Multimedia Communication Event
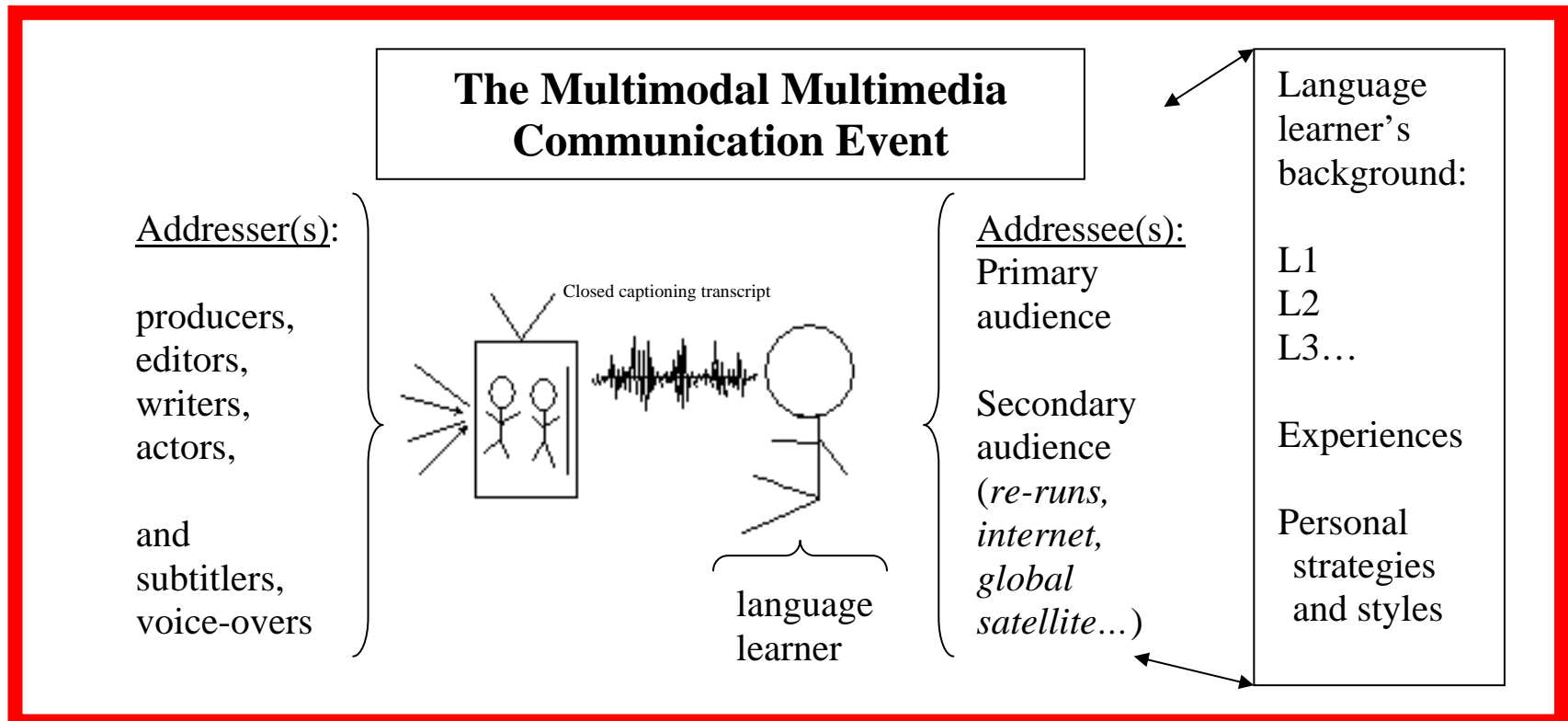
Briefly – on the left side of the MMCE the message is conceived, produced and executed. In the middle, the language learner or recipient of the message uses available multimodal options, embedded in the multimedia message, and individually interpreted using the right side: the influential background used by the recipient to interact with the text. Context is primary in the interaction and interpretation involved in the MMCE.

Sample references: Bakhtin, M. M. (1986); Barthes, R. (1957); Duranti, A. (1997); Goodman, K. (1994).; Hull, G. & Nelson, M.E. (2005); Jakobson, R.(1960) (1984), (1956); Kress, G. & T. Van Leeuwen. (1995); Mayer, R. (2001); McGurk, H. & MacDonald, J. (1976); Pourtois, G., de Gelder, B., Bol, A. & Crommelinck, M. (2005); Rosenblatt, L.M. (1994); Verschueren, J. (1999); Vygotsky, L. (1986); Wertsch, J. (1991).

Eye tracking: capturing interactions

An eye tracker was used in order to capture the attentional choices of the participants as they participated in the Multimodal Multimedia Communication Event (MMCE).

The eye tracker was a desk mounted camera, meaning that the reading occurred in a literacy event without any equipment interfering in the normal reading event.
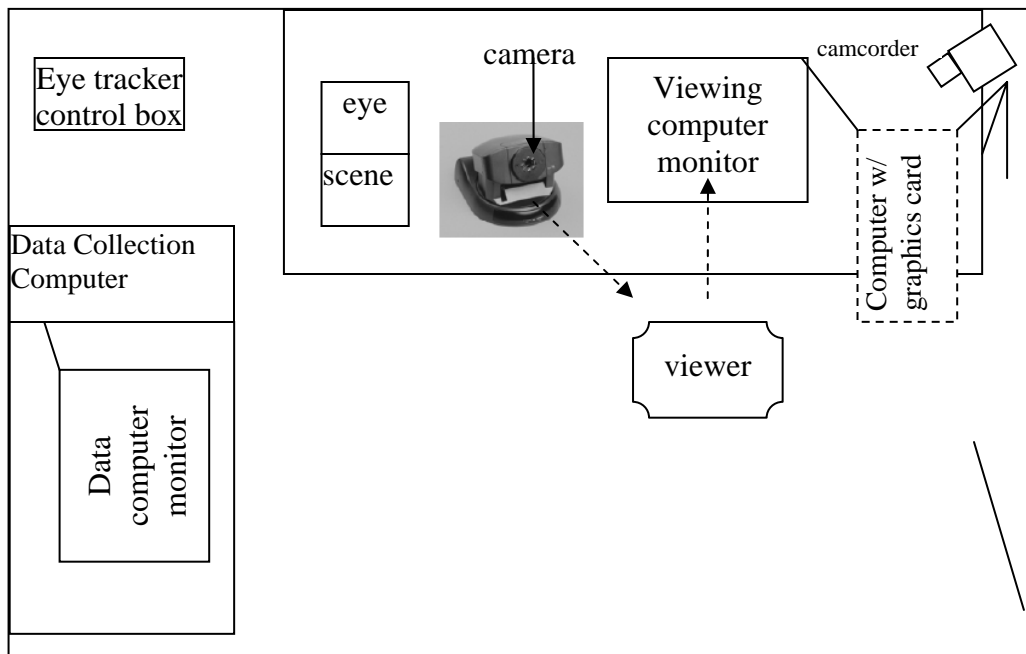

Illustration above: Eye Movement and Miscue Analysis (EMMA) Lab set up

The participants viewed and read the texts on a computer screen. The ASL 504 Eye tracker camera used a pupil-corneal reflection to calculate the movement of the participant's eye (visible as the white and black crosshairs in the picture below).

From the data collected, *fixplots* were constructed illustrating the detailed sequence (*gaze trail*) of *eye fixations* by the participant. The picture below to the left is a fixplot, while the right illustrates the single *fixation* of a participant as s/he views the text on the computer screen.
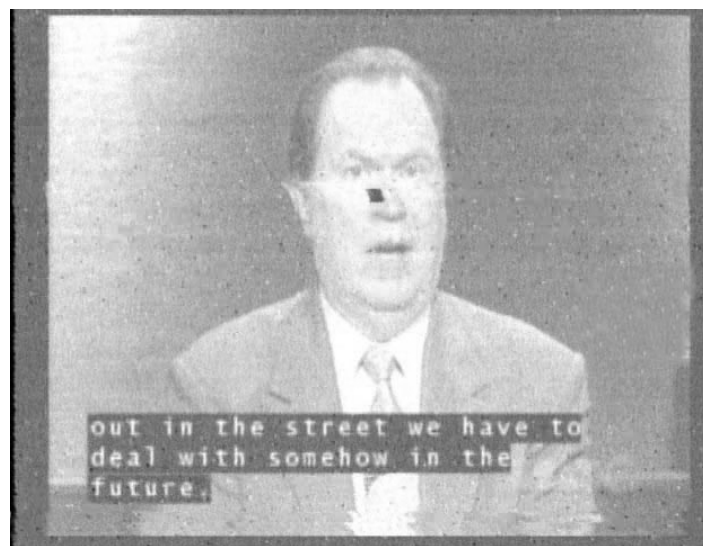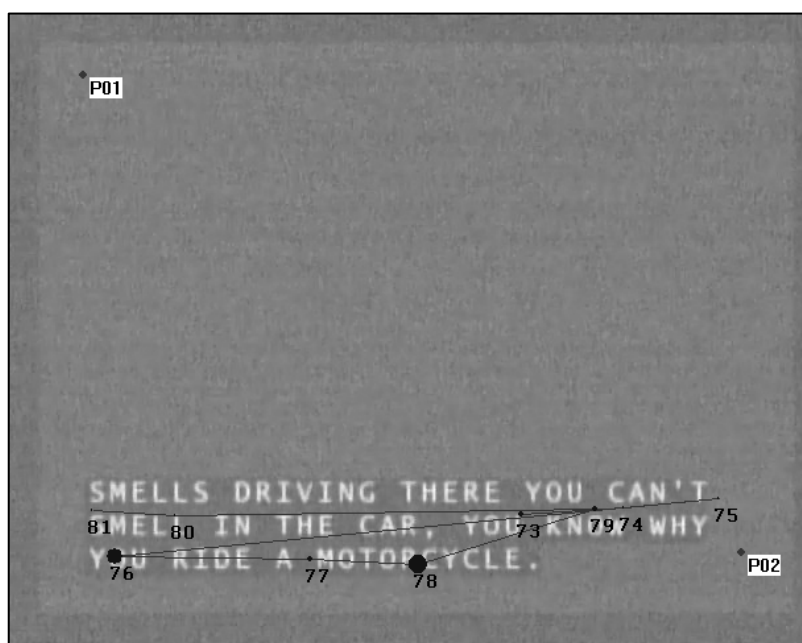

Example of video + cursor = where the viewer is looking

FIXPLOT: Fixation sequence on Closed Captioning only: larger circle = longer time.

Sample references for eye movement research: Ashby, J., Rayner, K., & Clifton Jr., C. (2005); d'Ydewalle, G., & Gielen, I. (1992); d'Yewalle, G., Van Rensbergen, J., Pollet, J. (1987); Drieghe, D., Brysbaert, M, Desmet, T. & De Baecke, C. (2004); Duchowski, A. (2002); Duckett, P. (2002); Flurkey, A. & Goodman, Y. (2004); Hegarty, M. (1992); Jensema, C., Sarma Danturthi, R., Burch, R. (2000); Just, M. & Carpenter, P. (1980); McConkie, G.W., Kerr, P.W., Reddix, M.D. & Zola, D. (1988); Murray, W. (2000); O'Regan, K. (1992); Oller, J. & Tullius, J. (1973); Paulson, E. & Goodman, K. (1999); Radach R. & Kennedy, A. (2004); Rayner, K. & Well, A. (1996); Rayner, K.(1998); Slykhuis, D., Wiebe, E., Annetta, L. (2005)

Questions & Methodology:

These concepts of the MMCE and this study draw upon the following areas of research which place the participants and the study at the confluence:
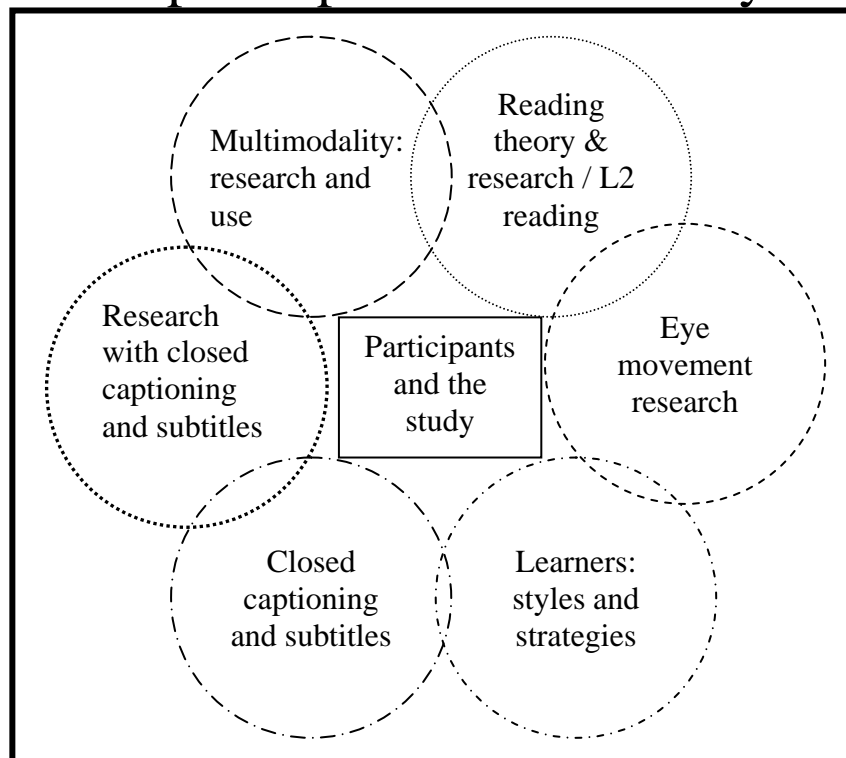
The research question was as follows:

What are the relationships, if any, that can be established between the individual viewer's reading patterns in multimodal multimedia environments and the self reported history related to multimodal use as language learning input?

Methodology:

In the entire study, 18 Native Speakers of English (NS) and 8 Non-Native Speakers of English (native language: Arabic) (NNS) participated in 1) viewing two media texts using an eye tracker followed by short content question interviews, 2) a longer extended interview, and 3) the completion of a questionnaire regarding learning styles and strategies. Four participants (2 NS & 2 NNS) from the above were selected for short case studies based on the criteria of the best collection of eye movement data within the two available texts.

Texts:

The texts used in this study were authentic texts taken from a local new show on a PBS station. The texts were aired over three years previous to the study to rule out prior viewing and recall possibilities by the participants. Both texts were shown multimodally: with aural, visual and print (closed captioning) modes available for use by the participants to help in comprehension.

Two multimodal texts were used: a 'Biker' text in which the narrator discusses a group of motorcyclists in Arizona, the misconceptions surrounding them, and safety issues with motorcycle riding. The second text, 'Airbag', interviewed a scientist about the dangerous chemicals in airbags and the future hazard of these chemicals leaking into the ground once the cars are sent to junk yards.

Needs: or… what do the recipients DO in order to get the needed information to interpret the message (text)?

In the MMCE, the participants' **backgrounds** influence their utilization of the multimodal aspects of the text. Aural and Visual modes are inherent channels of information in multimedia. Print, or closed captioning, was added as an additional source of available textual clues. Each participant utilized the available modes as each needed.

The participants' backgrounds:

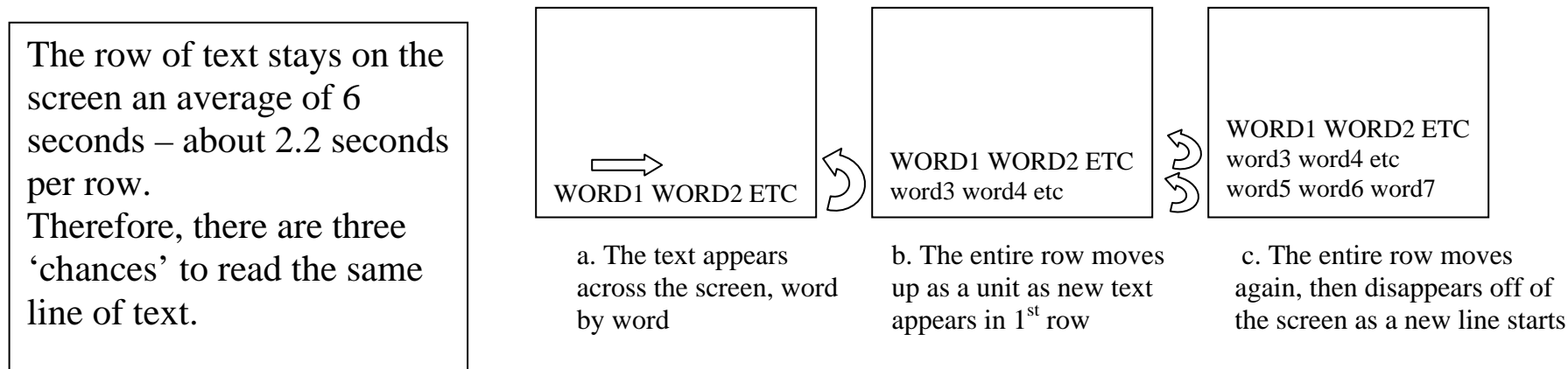|	Age, country	L2 study habits: reading	L2 study habits: multimedia	Learning Styles Inventory results:
Tariq	34, Saudi Arabia	Tries to read, but mostly learns by listening	Watches TV w subtitles, listens to podcasts	Balanced between visual and auditory learning
Farid	24, Saudi Arabia	Doesn't like to read. Likes to speak and use the language orally	Uses subtitles and closed captioning for English TV and movies	Auditory learning
Elena	20, United States	Reads L2 magazines, makes flash cards,	Will use L2 subtitles with movies occasionally	Balanced between visual and auditory learning
Sarah	21, United States	Only reads what is in the FL textbook	Doesn't like subtitles	Visual language learner

(this information was gathered through interviews and a learning style survey)

Sources of information:

Participants had multiple options to obtain information:
    + Aural: the narrator, the interviewees, the sound effects
    + Visual: the semiotic information in the video, the faces, the background
    + Print: the transcript of the aural mode
    + Background: the participants also make meaning using personal
   knowledge and previous experience with the content and language

Dynamic text: the closed captioning is <u>in motion</u>:

The row of text stays on the screen an average of 6 seconds – about 2.2 seconds per row. Therefore, there are three 'chances' to read the same line of text.

WORD1 WORD2 ETC

a. The text appears across the screen, word by word

WORD1 WORD2 ETC
word3 word4 etc

b. The entire row moves up as a unit as new text appears in 1st row

WORD1 WORD2 ETC
word3 word4 etc
word5 word6 word7

c. The entire row moves again, then disappears off of the screen as a new line starts

note: Closed captioning is a <u>transcript</u> of the aural mode

USE: or how do the participants actually use available information

The video screen was divided into two sections: look zone 1 (the closed captioning area) and look zone 2 (the visual pictorial area)

look zone 2

160°

look zone 1

Closed captioning: 3 rows

row 3
row 2
row 1
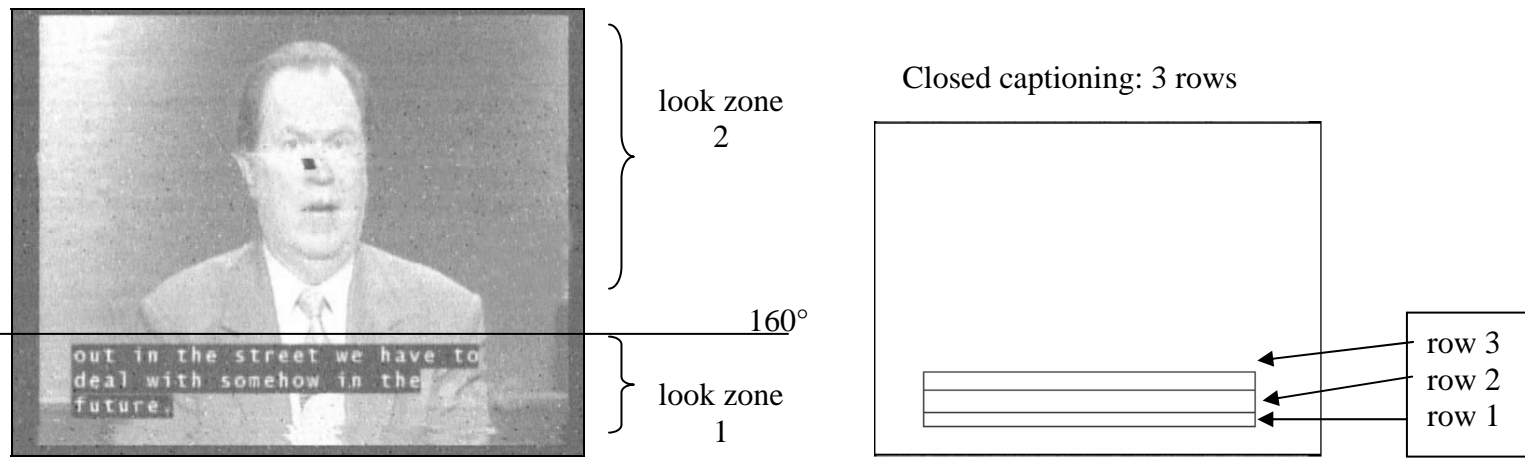
The following table illustrates the participants' eye movements between look zone 1 and look zone 2 during a 5 minute news story video:

	Eye movements: duration of 5 minute news story video	
NNS: Eye movements reflect preference for viewing and listening, but also include reliance on seeing word in print (look zone 1)	 **Tariq** Look zone 1: 61% Look zone 2: 39%	 **Farid** Look zone 1: 46% Look zone 2: 54%
NS: High proficiency, greater use of look zone 2 (aural and visual modes). Elena shows her preference for reading. Sarah chooses not to read.	 **Elena** Look zone 1: 17% Look zone 2: 83%	 **Sarah** Look zone 1: 97% Look zone 2: 3%

Results:

Allow language learning students multiple avenues of comprehensible input…

- Proficiency of viewer affects choices in modality selection
- How the learner interacts with texts reflects learning style preferences
- For higher proficiency viewers, modality use is a choice. Participants were observed using closed captioning to clarify the other modalities
- For lower proficiency viewers, modality selection is a choice but also a need: reading still occurred even for participants who do not like reading

Application:

- Promote and use available multimedia and multimodal forms in the language learning process – both in and out of the classroom
- Encourage language learners – both Second Language and Foreign Language – to use multimodal forms of language texts as language learning tools
- Use the available print modality to increase familiarity with orthography and reinforce the sound-print relationship of words
- Recognize that the individual's background and experience are unique to every literacy event, and therefore every multimodal multimedia communication event as well