Television and Language Development in the Early Years

A review of the literature

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Preface

In 2003, the National Literacy Trust commissioned Dr Robin Close to conduct a literature review of published research in order to understand more fully the relationship between television viewing in the early years and language and literacy development.

A priority of the National Literacy Trust is to understand the relationship between language development in children from birth to age three and later literacy development. As television is a central feature of modern western culture, the Trust wished to understand the effects of television viewing on children's language development and wider literacy. The literature review was intended to provide informational support for the Trust's Talk To Your Baby campaign. The review, however, was to be based on an objective assessment of available research evidence and not on any prior agenda of the organisation.

The review is written in the format of a report rather than an academic review to provide useful information for professionals concerned with understanding issues surrounding television use by infants, toddlers and pre-schoolers in a critical period of their language development. It is clear from the study that more collaborative research between early language specialists and media specialists is warranted to understand more fully the implications of the television medium and the amount of time young children spend viewing television for language acquisition. It is hoped that the review can serve as a starting point for such work.

The review concentrated on international publications over the last 30 years. Most of the material consulted, however, covered the period from the 1980s to February 2004. The review looked mainly at literature focusing on the birth-to-five age range, although priority was given to the birth-to-three age group to correspond with the Trust's focus. While the review investigated research on the relationship between television and language in the international community, priority was given to research in English-speaking countries and first language learners of English. As the Trust is mainly concerned with English literacy among English speakers, the review concentrated on this target group, although research on second language learners of English was not systematically excluded. Similarly, the absence of these other media does not mean that the researcher perceives them to be unimportant but, rather, it reflects the time constraints of the study.

Several people at universities around the world were contacted about their research and consulted on their knowledge of the field. These are mentioned in alphabetic order: Dan Anderson (University of Massachusetts); David Buckingham (University of London); Sandra Calvert (Georgetown University); Tricia David (Canterbury Christchurch University College); Jean Golding (Bristol University); Theresa Grainger (Canterbury Christchurch University College); Barrie Gunter (University of Sheffield); Aletha Huston (University of Texas); Marina Krcmar (University of Connecticut); Deborah Linebarger (University of Pennsylvania); Sonia Livingstone (London School of Economics); Jackie Marsh (University of Sheffield); Ian St James-Roberts (University of London); Patti Valkenburg (Amsterdam University); and Elizabeth Vandewater (University of Texas).

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Executive Summary

This literature review investigates the relationship between television and language development in children from birth to age five.

The aim of the review is to summarise international research pertaining to television and early language and identify the effects of high exposure (quantity of viewing) to television. It also considers caregiver roles in realising potential benefits or mitigating negative effects of television viewing. The research literature was analysed in the four headings listed below with their main findings.

The relationship between television and language development in the early years

- A child's age and linguistic maturity, the suitability of the content for his or her age group, the quality of the content viewed, the amount of television viewed, and the involvement of parents during viewing all inform the likelihood of language learning from television.
- Given the right conditions, children between the ages of two and five may experience benefits from good-quality educational television. For this group of children there is evidence that attention and comprehension, receptive vocabulary, some expressive language, letter-sound knowledge, and knowledge of narrative and storytelling all benefit from high-quality and age-appropriate educational programming. The literature has not, however, established whether children develop grammar, phonological awareness, and knowledge of literacy from viewing such programming. Although there is evidence that children's entertainment television provides opportunities for verbal interaction and talk, there is also evidence that children who are heavy television viewers have lower expressive language scores. Children's programmes can enhance expressive language by encouraging talk, but more evidence is required to demonstrate long-term effects. And, although there is a correlation between low expressive language scores and television viewing, specific cause and effect relationships have not been identified.
- For children under the age of two, the literature is far less certain about the language benefits of the current crop of children's television. There is some evidence that children at 18 months will be attentive to the visual stimuli of such programmes and respond verbally to them, particularly if the content is of high quality. Other evidence suggests that children under 22 months acquire information, or learn first words, less effectively from television than from interactions with adults. This research questions the extent that children under two understand television content as opposed to being entertained by it. Evidence is strongest that by 24 months of age, children comprehend content and may extend their language by viewing television. In all cases, the individual characteristics of the child, such as age and linguistic maturity, will determine how a child will respond to television and what he/she will acquire from it. More research is required on this age group.
- Viewing by children of programming aimed at a general or adult audience is correlated with poor language development in pre-schoolers. Evidence suggests that children who are frequently exposed to such programmes tend to have a lower vocabulary, poorer expressive language and to engage in less TV-talk (i.e. talking about television) with adults. This is attributable to both the quality of the content on offer and the quantity of exposure to television more generally.

The characteristics of television programmes that stimulate or hinder language development in their target audience

- The optimal television viewing experience for language development is one that includes exposure to age-appropriate content, to new and familiar words, and which offers possibilities for interaction and adult co-viewing and teaching.
- Factors associated with a positive viewing experience include the following: minimal visual or auditory stimuli for programmes targeting infants, a balance between new and familiar words, interesting material for adults to encourage co-viewing, use of some sophisticated language, formats that offer possibilities for interaction and participation through songs and questions, and the age-appropriateness of the programmes.
- Conversely, the factors associated with a negative viewing experience include excessive visual and auditory stimuli (for under-twos), complex narratives, the presence of older siblings during viewing, language-poor content and extensive co-viewing with adults of adult programming.
- Co-viewing with adults is not necessary for vocabulary development when children are viewing high-quality and age-appropriate programming and confronted with familiar words and their meanings. Some evidence suggests, however, that co-viewing aids oral ability and comprehension of unfamiliar words and meanings.
- Where televisions are located in a child's bedroom, this is associated with reduced opportunities for co-viewing with parents and also with increased viewing of general or adult programming. The newness of the trend means that research has yet to fully explore the effects of children's viewing and behaviour patterns while watching television in their bedrooms.
- Repetition of content by video has been shown to support learning from educational programming. The optimal quantity of video viewing, however, is yet to be identified.

The quantity of television that enhances or detracts from language development

- A variety of studies have demonstrated that children who are heavy viewers of television are more likely to be linguistically underdeveloped, although a direct causal relationship has not been established.
- Children's consumption of television increases as a result of children's age, the availability of the television in the home, particular family circumstances (low education of the parents, young parents, low socio-economic status of the family, low IQ and male gender of the child), children's time spent in the home, carers' positive views on the role of television, and high frequency of parent-child co-viewing of general audience programmes.
- Reduced exposure to educational television is associated with low time spent at home, presence of older siblings, low socio-economic status, children's poor language ability and male gender.
- The correlation between high quantity of general television viewing and poor language ability may be attributable to the quality of content viewed and/or the time spent viewing. More research is required to understand what happens in situations where children are not attending to television when it is on for extended periods in a day. Similarly, more research is required on the effects of decreased interactions with adults who are heavy viewers of television.
- More research is required on the optimal quantity of both educational and general audience television.

The kinds of activities in the home that maximise benefits and minimise the adverse effects of television

- The literature has not identified specific activities in the home that work best to maximise benefits and minimise the adverse effects of television, although some conclusions can be drawn on ways to ensure an optimal viewing experience and to regulate the quantity of viewing.
- Carers should select high-quality, age-appropriate educational programming in television and video formats; programmes that offer opportunities for verbal responses and a balance between familiar and new content. They should select children's programmes that can be enjoyed by both adult and child, and programmes with minimal stimuli, such as a single adult speaker, for children under two.
- Carers should ensure that younger siblings are not prevented by their older siblings from viewing age-appropriate educational programming.
- Carers should interact with children while viewing, explain and model familiar words, repeat content by way of videos, and locate the television in a room where co-viewing is likely to occur.
- Carers should limit exposure for the under-twos in favour of other one-to-one language enhancing activities, encourage viewing of high-quality, age-appropriate educational television for children aged two to five, choose educational programming over children's entertainment programmes, limit adult and family viewing of general audience television, and make television less readily available in the home.

Conclusion

- Although there are many promising findings from the studies conducted on children over two, more needs to be learned about the relationship between television viewing and language development for the under-twos.
- The research has yet to identify either the effects or implications of a medium that does not modify its output in response to child verbalisations on either receptive or expressive language compared to conversational settings.
- More research is required on the optimal quantity of both educational and general audience viewing for children, and the effects of sustained exposure to background television. Specific effects and causal relationships, such as whether heavy television viewing actually harms language development, require further study. Comparative analysis of programme content to identify the markers of high-quality programming should also be undertaken.
- Television, although beneficial under certain conditions, should be seen as one of many activities that offer opportunities for language learning. Television can promote talk, but this talk needs to be harnessed by an adult if the learning experience is to extend beyond the airing of a programme.
- At the same time, until optimal quantity is known, television viewing should be closely monitored to keep it to a minimum, especially for the under-twos. Given the uncertainty within the literature, the cautious guidance of the American Academy of Pediatrics, which advises strictly limiting the exposure of under-twos to television, seems prudent.

1. Introduction

There is growing concern that children's language abilities on entry to school have declined over the last ten years (NLT and NAHT, 2001). This is matched by concern that there may be negative effects of increased exposure to television and other media among children in the early years (BBC, 2003). Since the 1950s there have been some fundamental changes in western culture which have placed television media at the epicentre of family life. Over the course of the last 50 years, television technology has changed with larger and higher-resolution screens, clearer audio, and greater affordability: all of which have improved the quality of the viewing experience and increased viewing. It is becoming commonplace to have more than one television in a household and televisions in children's bedrooms. Producers of children's educational programmes are also now working closely with software companies to produce educational software (Revelle, Medoff and Strommen, 2001). More recently, television technology is in evolution with the introduction of digital interactive services, which, if applied, may enhance some of the instructional qualities of children's educational programming (DTI and DfEE, 2001; DTI, 2003). All this points to a certain urgency for understanding the implications of the television medium for language development in young children in the changing technological environment which is influencing home practices.

This report reviews international research on the relationship between television and language development in children from birth to age five. It also considers the implications of the quantity of television viewing for language development and the role of carers in either realising potential benefits or mitigating the negative effects of television. The terms of reference for the study were to investigate the following questions:

"What does international research tell us about the relationship between television viewing by children under five and their language development?"

"Is there any evidence about the quantity of television viewing and the role of parents and carers which would be helpful in either maximising the benefits (or mitigating the dis-benefits) of television viewing in the birth-to-five period?"

Research into these questions yielded less literature than was expected for a subject as important as language development. To carry out the research, the ERIC database served as the main source for document retrieval, particularly for journals and publications before the mid-1990s, when documents were not electronically stored or available through EBSCO. At the time of search and retrieval, 2,837 titles appeared for television research, and approximately 85 titles for television, language development and children. Most of the research covered primary school children with surprisingly few studies addressing pre-school children aged three to five. Fewer titles still were found for children under the age of three. Search terms for television included television, media and video as well as children's television, educational television and television research. For language, terms included language skills, speech skills, speech communication, oracy, oral communication, language acquisition, language development, language disability, comprehension and vocabulary development. Terms searched for the age range included infant, pre-school, and early childhood. Searches were made of popular children's programmes such as *Teletubbies* and *Sesame Street*.

The field is heavily dominated by research on educational programmes, particularly *Sesame Street*, which targets children aged three to five, while little research pertains to more general audience viewing and potential effects. Moreover, research on children under two was particularly limited as children's programmes, such as *Teletubbies*, have only relatively recently become available for this age group. Furthermore, research on this age group is methodologically very complicated and may explain why so few studies have been conducted. The question of quantity of viewing for this age group is an area that is also under-researched, overshadowed by the paucity of research on general audience viewing. Meanwhile, the literature provides some indication of the ways in which carers can maximise benefits and minimise disadvantages of television.

It is acknowledged that the birth-to-five age range covered in this review spans different linguistic stages. Infants (birth to one) bring to their television viewing different skills than toddlers (one to three) and pre-schoolers (three to five) who, under normal circumstances, have greater linguistic capability when confronted with televised information. Language, that is speaking, listening, comprehension and vocabulary, is learned mostly through interaction with the environment and with adults. The extent that television provides similar interactive support and prepares children for literacy is a subject which preoccupies the literature.

Research on language learning in naturalistic settings (as opposed to television) has demonstrated the importance of children's verbal interaction with adults at each stage of development. Evidence suggests that low opportunities for verbal interaction in the early years is associated with poor vocabulary and elevated risk of later difficulties in the primary grades when higher comprehension is required (Snow, Barnes and Griffith, 1998, p. 122). The correlation between adult interaction and early language is therefore very strong and persists long after a child enters school. In the early stages, when infants begin communicating by smiling, blinking and crying, adult input that stimulates language, or 'mother-to-child input,' may be auditory (intonation, pitch and other cues that help the child to focus and prompt a response) (Sachs, 1977) or visual (facial expressions etc) and physical closeness. This input helps to develop the child's attention and, over time, an understanding of communication (Bruner, 1983). Research has suggested that mothers are programmed to respond to their children's sounds in a way that encourages language development (Snow, 1972). Language will develop in a child regardless of this input, but current brain development theory argues that adult input stimulates the brain activity necessary for developing language and enables individuals to fulfil their potential regardless of their genetic makeup (Zero To Three, 2001).

During the phase of rapid vocabulary development starting at between 12 and 18 months, environmental factors, particularly those in the home, continue to nurture the acquisition of language (Paley, 1986; Wells, 1987). The kinds of language-enhancing activities language specialists promote are songs, rhymes, imaginative play, book reading, one-to-one parental interaction and conversation (Wells, 1987; Bruner, 1983; Crain-Thoreson, Dahlin and Powell, 2001; Crain-Thoreson, Bloomfield, Anthony, Bacon, Phillips and Samwel, 1999). These will help prepare pre-school children for school by developing pre-literacy skills associated with oral language – "knowledge of word meanings, an understanding that print conveys meaning, phonological awareness, and some understanding of how printed letters code the sounds of language" (Snow et al, 1998). As a pre-literacy strand, oral language involves speaking/listening, phonological awareness, narrative, de-contextualised talk and talk about texts. This 'strand of literacy experience' along with reading and writing requires adults to provide children with

opportunities, recognition, interaction and models (the ORIM framework developed at the University of Sheffield) (Hannon, 2000).

As a result of the perceived importance of verbal interactions in the home for early language, language specialists have traditionally recommended limited exposure to television, particularly for children under two (Snow, Barnes, Chandler, Goodman and Hemphill, 1991, pp. 63, 64; American Academy of Pediatrics, 2004). However, acceptance of television as a learning tool has been aided by the growing body of research surrounding educational programming, particularly arising from the *Sesame Street* phenomenon and its 30 years of supporting research (Fisch and Truglio, 2001; Snow et al, 1998, pp. 310-11). Advocates of educational television argue that many language-enhancing activities thought to be associated with parent-child interaction can be replicated at least in part by educational television. Parent-child shared book reading, for example, was identified by the Committee on the Prevention of Reading Difficulties in Young Children in the US as a beneficial activity that promotes verbal interaction, vocabulary learning and knowledge of print in infants and toddlers (Snow, Burns and Griffith, 1998). Mabel Rice identified many similar characteristics of book reading in *Sesame Street* (Lemish and Rice, 1986). She said about *Sesame Street's* educational success that it "closely resembles that of a mother talking to her child, with simple sentences, much talk about the here and now, repeated emphasis on key terms, and an avoidance of abstract terminology" (Rice et al, 1990, p. 422).

This review looks at the extensive body of literature on educational television and these surrounding claims of educational benefits for pre-school children. However, it also reviews literature on non-educational and general audience programming to investigate whether content, as well as quantity, may influence language ability. Section 2.1 concentrates on the relationship between television viewing and language development, looking at children's programming and general audience viewing. Television's wider impact on subsequent literacy skills, overall educational achievement and cognitive development was also considered. The review did not investigate the effects of television on health or wellbeing, unless there were links made with language development. Several categories of language are examined including attention and comprehension, vocabulary, expressive language, grammar and other pre-literacy skills associated with oral ability such as phonological awareness, knowledge of narrative and talk about texts. These last three pre-literacy skills are grouped together under one heading because there are limited research findings to report on them.

Section 2.2 identifies the characteristics of quality programming and of an optimal viewing experience for early language development. The study reviewed published material on the main factors that contribute to beneficial (or unsatisfactory/harmful) television viewing from the point of view of language and literacy development. Factors included the nature of supervision and interaction by carers during viewing, the location of the television in children's bedrooms where there is likely to be no parental supervision, and the distinction between television and video viewing in respect to opportunities for repeat viewing with the latter.

Section 2.3 concentrates on the question of whether or not there is an optimal quantity of television viewing for children between birth and age five. The review considered the optimal quantity/frequency of television viewing for children's language development and, conversely, any adverse effects of excessive or insufficient television viewing on their language development.

Lastly, section 2.4 identifies in greater detail the role of parents/carers in maximising the benefits and minimising the disadvantages of television. Both the role of carers in providing an optimal viewing experience and in ensuring that the quantity of television is optimal are considered.

2. Review Findings

In order to address the terms of reference for this study, the findings of the review have been analysed under the following headings:

- the kind of relationship that exists between television viewing and language development in the early years
- the characteristics of television programmes that stimulate or hinder language development in their target audience
- the quantity of television that enhances or detracts from language development
- the kinds of activities in the home that maximise benefits and minimise the adverse effects of television.

2.1 The relationship between television and language development

To investigate the relationship between television viewing and language development, the review considered the aspects of television viewing associated with children's and general audience programming. There were several categories of language development within the birth-to-five age group that were of interest, namely attention and comprehension, vocabulary development, expressive language, grammar, and pre-literacy skills of phonological awareness, knowledge of narrative and of literacy. These skills are associated with toddler and pre-schooler language ability and reflect the main body of research in this field. Most of the research on these aspects of language has also come as a result of increased availability of educational programming for children aged two to five. Infant communication skills such as attention, interaction, visual and vocal responses (and babblings) are included where appropriate in the above language categories under children's television.

2.1.1. Children's television

'Children's television' is often classified as being either educational or entertaining, but these categories are not as straightforward as they may seem. Educational programmes, the most famous being *Sesame Street*, serve to promote school readiness in children between the ages of three and five. Much of the research on educational television reviewed in this report was American. In the American research, children's entertainment programming also typically implies commercial cartoons targeting children older than five, such as *Scooby-Doo*. The cartoon format, however, is currently used for a range of programmes targeting pre-schoolers which have not yet appeared in the academic research. These programmes include *Thomas the Tank Engine, Bob the Builder, Postman Pat*, etc. Hence, 'cartoons' in the context of the report refers to commercial cartoons as presented in the American research and discussion of their impact on children's learning is also included under general viewing. In the UK, the categories of education and entertainment are blurred as *Teletubbies*, which targets the under-fours, also falls into the category of entertainment even though the goal is to promote "learning through play" (BBC, 2004). Although the emphasis is on entertaining young children, the suggestion that children will learn through play implies an educational outcome that, like research on *Sesame Street*, some researchers have sought to measure. For children between the ages of two and five, research suggests

that high-quality educational television can aid many aspects of language development, while there is conflicting evidence about what children under two are acquiring from both educational and entertainment programming.

Positive effects of educational television depend largely on the age of the child, his/her pre-existing cognitive and language development as well as the age suitability of the content viewed. Some of the findings have been:

- prior to 18-22 months, children may not learn effectively from television compared to live situations (Barr and Hayne, 1999; Krcmar, Grela and Lin, 2004)
- children imitate songs and speech from television between the ages of 18 and 24 months (Kodaira, 1990)
- parents believe that their children learn language from television at 30 months. In an Australian study, parent interviews of children at 30 months showed that 86 per cent of 103 children in the study learned language; 52 per cent learned music/rhymes/song (Cupitt et al, 1989)
- pre-school children learn some pre-literacy skills from specific programmes such as *Sesame Street*
- children who view *Sesame Street* between the ages of two and three have higher scores on language, maths and school readiness at age five. Bickham, Wright and Huston (2001) found that watching educational television such as *Sesame Street* between ages two and three predicted higher scores on measures of language, maths and school readiness at age five
- four-year-olds who are frequent viewers of *Sesame Street* are more likely than non-viewers to identify colours, count to 20, recognise letters and tell connected stories when pretending to read (Zill, 2001)
- children viewing educational television show signs of having an interest in learning and a positive perception of school learning. This is retained into high school (Bickham, Wright and Huston, 2001)
- viewing educational television between the ages of two and three can have long-term positive results. Viewing at age four and beyond does not affect later scores (Bickham, Wright and Huston, 2001)
- the 'Recontact Study' (15 to 19-year-olds) found similar evidence that there are positive long-term effects of educational programming such as *Sesame Street* (Anderson, Huston, Smith, Linebarger and Wright, 2001)
- co-viewing of informative educational programmes with children aged three to seven was positively related to children's attention to television, receptive vocabulary and use of print (St Peters, Huston and Wright, 1989).

These findings are detailed more fully below in the following language categories: attention and comprehension, vocabulary development, expressive language, grammar development, and the pre-literacy skills of phonological awareness, narrative and storytelling, and knowledge of literacy.

Attention and comprehension

Much research has focused on understanding why and how children attend to television and whether viewing behaviours are age related. This has included an examination of how attention to television may relate to linguistic comprehension. There is a large body of research on children's viewing patterns, their attention to television and their comprehension of televised information.

Research has found a strong correlation between attention to television and comprehension. That is, children require a certain comprehension of language to attend to television so that attention increases between birth and age five (Anderson and Levin, 1976; Anderson, Lorch, Field, Collins and Nathan, 1986). Others have argued that attention to television raises comprehension of television and improves receptive vocabulary in pre-school children (St Peters et al, 1989). The pre-school child is also able to selectively attend, search for comprehensible content and absorb information from viewing (Rice and Lemish, 1986; Rice, Huston and Wright, 1982).

Infants, according to the Anderson and Levin (1976) research, have lower attention levels, although they will attend to some educational television, because of their undeveloped language ability. These findings and those for older children relate to programme content and its ability to interest and engage young viewers for sustained periods. They have looked at educational programmes such as *Sesame Street* which have been designed to encourage children aged three to five to attend to television. The content of *Sesame Street*, according to Rice and Lemish (1986), is effective in drawing the attention of even younger children (ages six months to three years) and, depending on factors such as age, linguistic maturity, volubility and parent responsiveness to the child, such a programme may encourage young children to talk. Programmes for audiences younger than four, such as *Teletubbies* and *Barney and Friends*, use similar techniques to sustain children's attention. According to Anderson and Evans (2001), however, a reading of research for under-twos points to low attention and little benefit from television for children under one. They suggest that children's ability to acquire information from television appears at age three.

The question of low infant attention was investigated by New Zealand researchers Barr and Hayne (1999) who studied whether infants acquire information from television. Specifically, they looked at infants' ability to imitate actions from video in order to understand what children aged 12, 15 and 18 months might learn from television. Imitation is one way infants communicate before they develop language comprehension or the ability of language production. Research methods included the use of puppets to simulate age-appropriate content that might be found in a children's programme and simple actions, such as shaking the puppet, to produce an outcome (ringing bells) which participating infants might imitate. The actions were modelled in both live and video settings, using children's home television. They found that children aged 12, 15 and 18 months were all able to imitate actions when modelled live but that there were differences in ability when the same actions were modelled in video. Children aged 15 and 18 months imitated some actions from video but the performance was better in live conditions. Younger children, those 12 months old, were unable to imitate from video. Children did show signs of being entertained and interacting with video as indicated by their vocalisations but the evidence, according to the researchers, suggests that young children have difficulty encoding and using information from television compared to live one-to-one interaction with adults. One explanation for this is that infants have underdeveloped memory, which improves with age and is enhanced through live interaction with adults. It was found, for example, that 15-month-old children had less difficulty remembering actions from live demonstrations compared to those in video conditions. Krcmar et al (2004) also found that children under 22 months could not learn from television compared to live interactions with adults. They raised concerns that *Teletubbies* offered more stimuli than children under 22 months could process or learn from. Krcmar and Grela (2004) proposed that children's enjoyment of *Teletubbies* reflects the age group's fascination with visual stimuli more generally. They, along with Barr and Hayne (1999), raised questions about the benefits of television for this age

group as television may provide entertainment but not necessarily informational learning.

In contrast, recent research on *Teletubbies* in Australia suggests that children at 18 months will attend to television in the same way as older children. Roberts and Howard (2004) argue that when content is interesting to young children, as in the case of *Teletubbies*, then children actively attend and interact with television while they attempt to "make cognitive sense of the world". Based on observations of children's behaviour while viewing *Teletubbies*, they argue that attention (making sense) and attention (pleasure) are directly related aspects of infant viewing behaviour. Their study provides rich data about children's responses to the programme, but it is not yet clear from their research whether these responses actually mean that children understand the content. Some further testing of some of the issues raised by Roberts and Howard (2004), namely the link between affective responses and cognition, is required before conclusions about what children learn from television can be drawn.

Children younger than one also appear to attend differently to visual and auditory television stimuli. Hollenbeck and Slaby (1979) tested the visual and verbal responses of six-month-old infants to television. They considered visual and verbal responses in situations of picture alone, sound alone, and picture and sound. A control condition of unpatterned sound-plus-picture was administered against the standard condition of patterned picture-sound. Infants attended to television more in the standard viewing condition of patterned picture-sound than the picture alone, sound alone, or control unpatterned picture-sound condition. Their results for six-month-olds' visual attention to television were similar to that found in one-year-olds by Anderson and Levin (1976): that is, that educational television could sustain visual attention for brief periods. Barr and Hayne (1999) also noted that children aged 12 to18 months showed signs of attending and being amused by videos, while not necessarily comprehending the content. Hence they question the significance of attention for comprehension.

Hollenbeck and Slaby (1979) also noted differences in infant verbal responses to the different television conditions. They were higher during the picture-only condition but lower during the auditory condition. They interpreted their findings as suggesting that auditory stimulation might inhibit infant vocalisation. This theory, they argue, would require testing using baseline measures of vocalisation. Some explanation is also needed for this variation between visual and verbal responses in the different conditions before any conclusions can be drawn about television's effects on child visual and verbal behaviour.

These studies suggest that there are gaps in our knowledge of the relationship between attention and comprehension in children under two. Future research should continue to identify the meaning behind infant vocalisations in response to television as they learn and are entertained. Research has begun to look at these infant interactions with age-appropriate television, but the implications for linguistic comprehension are still far from understood. Secondly, in response to the Hollenbeck and Slaby research, it would appear that more research is needed on how infants respond to visual and auditory stimuli from television. In particular, their study has raised the important question of whether or not there are any risks that auditory stimulation from television may inhibit infant vocalisations.

Another question is whether there are different risks when children are attending to television compared to when they are exposed to background media. Anderson and

Evans (2001) expressed particular concern that there may be dangers of background media for children's private vocalisations during play, which are associated with children's development of verbal thought and internalised self-control of behaviour (Vygotsky, 1978). The long-term implications for language must be assessed.

Vocabulary development

Where researchers have found a positive relationship between television viewing and language development is in the vocabulary development of pre-school children aged two to five. Vocabulary is both receptive and expressive. Receptive vocabulary is the comprehension of spoken words (such as nouns or adjectives) and expressive vocabulary is word production. Vocabulary relates also to syntactic ability (the complexity of sentences) and lexical ability (word diversity). These skills relate broadly to toddlers and pre-school children who have this varied vocabulary capability. The research points mainly to educational television's positive correlation with increased scores in receptive vocabulary of pre-school children. This research has centred on *Sesame Street*, which targets that age group and claims to develop vocabulary. In fact, much educational programming has a wide range and significant amount of vocabulary on offer to promote children's learning of vocabulary (Klein, 1997). A recent literature review by Naigles and Mayeux (2001) concluded that research has demonstrated that children learn vocabulary and extend understanding of familiar words through educational television such as *Sesame Street* and the more recent *Barney and Friends*. For the purpose of this report, the key questions are, what aspects of vocabulary development have been evaluated and under what circumstances has vocabulary been found to be enriched by children's television? Furthermore, are there any cases where vocabulary has not been enhanced by children's programming? The following considers research on television's relationship with receptive vocabulary development in both pre-school children and the younger infant age group.

Naigles and Mayeux's (2001) analysis of the literature on vocabulary concluded that there is evidence of lexical development in pre-school children as a result of educational television. In this case, the researchers are concerned with the child's ability to distinguish individual words and their meanings as they are spoken. The process of lexical development is aided by adult speech that provides examples of word pronunciation, emphasis and meanings. This is particularly helpful for learning verbs. They identify the work of Mabel Rice and her colleagues (Rice, 1984; Rice and Haight, 1986) during the 1980s on *Sesame Street* as indicating that educational television can facilitate children's learning of new words. Her work revealed that the programme's use of words that are prosodically stressed, or spoken louder than other words in a sentence, enables children to distinguish words from the rest of a sentence. Programmes are also designed to provide referents for children to enable them to interpret the meaning of unfamiliar words.

Rice and Woodsmall (1988) found that children can 'fast map' new words (object, action and attribute words) from children's television, not specifically educational television. 'Fast mapping', the ability to gain a quick and partial understanding of a word's meaning from a single exposure, is the first phase in lexical acquisition until children begin acquiring and storing more information with subsequent encounters with a word. Typically, children aged seven to 14 are capable of fast-mapping. The researchers studied the receptive vocabulary development in three and five-year-olds watching animation for children rather than educational television. They looked at children's

processing of object, action, attribute and affective-state words to determine the ease and order of acquisition. The researchers found that children can learn something about novel object, action and attribute words while viewing television. However, while "these words were amenable to quick comprehension", "affective-state words were resistant to quick interpretation." (p. 426) They also found that overall, five-year-olds acquired more receptive vocabulary (object and attribute words), possibly due to prior linguistic knowledge and viewing experience. However, they found that television's positive effects were not limited to children with more advanced vocabularies. Overall, they concluded that because pre-schoolers acquire new words with minimum exposure and tutorial assistance, television is well suited to language learning. Rice and Woodsmall (1988) contend that "a minimum of overt salience-enhancing support is adequate for children to parse a new word and arrive at an initial at least partial comprehension of meaning." (p. 426)

While it appears that the over-twos 'fast map' vocabulary from television, children under two do not, according to a recent study. Krcmar et al (2004) investigated whether toddlers aged 15 to 24 months could learn first words from the children's entertainment programme *Teletubbies*. The experimental study used a repeated measures design, and compared children's ability to learn novel words in five different conditions. These included the presentation and identification of a novel word by: an adult speaker via a live presentation when the toddler was attending (i.e. joint reference), an adult via live presentation when the toddler was not attending, an adult speaker on television, and an edited clip from *Teletubbies*. They found that children learned novel words best in a joint-reference situation, where the adult actively helps the child to focus on an object. Children under 22 months did not appear to learn novel words from television as effectively as from live conditions or an adult speaker on video. Children over 22 months did acquire some information from *Teletubbies*, suggesting that children can learn vocabulary from television once they already have some foundation in language. The researchers conclude that toddlers cannot acquire 'first words' from television compared to live one-to-one interactions with adults. The under-twos might be able to acquire some information from television when there is little stimuli on offer in a programme, such as an adult speaker (Rice, 1983, 1984), which they suggest is not the case for *Teletubbies*. Results emphasised the importance of responsive language teachers and interactions with adults.

While it appears that children over the age of two are able to learn some vocabulary quickly through 'fast mapping', what evidence exists that television can promote deeper lexical understanding? Naigles and Mayeux (2001) concluded that research does support the claim that, over time, children acquire considerable lexical knowledge, or information about word meanings, from television viewing. They also investigated whether research reveals that repetition of words on children's programmes is responsible for gains in lexical knowledge or whether repetition of words by co-viewing adults is responsible for gains. Their reading of the evidence suggested that when language in children's programmes is pitched at the level of the child who is watching the programme, the child does not require adult co-viewing to acquire words. In situations where a child is exposed to many unfamiliar words or concepts, adult co-viewing may be more effective in vocabulary development when the adult provides explicit definitions, explanations for potential confusions and additional exemplars (Naigles and Mayeux, 2001).

The most commonly-cited study reporting significant vocabulary gains is the Rice, Huston, Truglio and Wright (1990) longitudinal evaluation of children's vocabulary

development while watching *Sesame Street*. The study used one-week diaries of children's television viewing over two years from two cohorts of children, aged three to five and five to seven. Child and family measures were taken of children's vocabulary skills, gender, presence of siblings, parent education, parent encouragement of *Sesame Street* and parent attitudes about television. From their findings it appears that children aged three to three-and-a-half who watch *Sesame Street* can learn new words from the programme independent of adult co-viewing and that this predicted language scores at age five. Viewing *Sesame Street* at age five, however, did not predict vocabulary scores at seven. Findings were directly related to particular attributes of *Sesame Street* which specifically target the three-to-five age group and confirm the potential benefits for children accrued through viewing high-quality, age-appropriate educational television. Positive gains in vocabulary as measured by the Peabody Picture Vocabulary Test (PPVT) remained strong after controlling for other potential influences such as parent education, family size, child gender and parent attitudes. Similar findings were previously reported by St Peters, Huston and Wright (1989) in their earlier two-year study of 271 children between the ages of three and seven, also watching *Sesame Street*. St Peters et al (1989) also found that receptive vocabulary in three to five-year-olds, measured by the PPVT, is encouraged by age-appropriate educational television independent of parent co-viewing. Singer and Singer (1998) also found that children acquire some aspect of word meanings from watching *Barney*, although they concluded that children who received some adult tutoring on unfamiliar words used in *Barney* learned more.

More recently, Wright and Huston (1995) pursued their investigation of the long-term benefits of educational television in the Early Window Study, 1990-3, looking specifically at low socio-economic status, ethnically-diverse children in urban mid-west America, at ages two to three and four to seven. The children's primary language was English. They investigated whether or not the effectiveness of educational programmes (*Sesame Street*) in teaching receptive language is determined by age and home factors such as socio-economic status or ethnicity. Does *Sesame Street*, for example, benefit advantaged children more than disadvantaged children and therefore increase the social divide? Measures for children's television viewing, home environment and language and school-readiness skills were taken. The two cohorts were studied in home and office visits and bimonthly time-use diaries were collected by telephone. On language measures, children were tested for vocabulary using both the Primary Language Scale (PLS) for two-year-olds for an index of verbal skills and the Peabody Picture Vocabulary Test Revised (PPVTR) for four-year-olds, testing receptive vocabulary. For Spanish children, the PPVTR was administered in English and in Spanish in order to obtain comparative measures of language ability. However, researchers were mainly interested in whether Spanish children were acquiring English vocabulary from educational television. Overall, they found that there is a correlation between school readiness/vocabulary skills and viewing educational programming aged two to three. That is, regardless of the children's initial skills and the characteristics of their families (maternal education, income, primary language and home environments), children who watched *Sesame Street* from ages two to three gained in pre-academic skills up to and including age five (Wright, Huston, Scantlin and Kotler, 2001). Children with good language skills at age five tended to have watched more educational television and fewer entertainment programmes such as commercial cartoons in primary school years than children with poorer skills. From their findings, the researchers concluded that children from disadvantaged backgrounds do not watch enough educational programming such as *Sesame Street* (Wright et al, 2001). They

also suggest that the key time for learning language from educational television is between the ages of two and three.

From their longitudinal study, the researchers also concluded that the early effects of television viewing can be lasting. The Early Window Study was followed up with the Recontact Study which aimed to find out if the effects of pre-school television viewing were related to adolescent achievement, behaviour and attitudes (Anderson, Huston, Schmitt, Linebarger and Wright, 2001). The viewing of *Sesame Street* in the pre-school years was associated with higher grades, reading more books, placing more value on achievement, greater creativity and less aggression (Huston, Anderson, Wright, Linebarger and Schmitt, 2001).

All these studies would suggest that vocabulary development is directly related to television content. The evidence is strongest that for pre-schoolers aged three to five, content determines language acquisition of familiar and new words and meanings. The one study that was found on infant vocabulary acquisition suggested that content does determine vocabulary growth in infants but that, for the most part, the under-twos do not benefit from the medium when learning first words compared to live one-to-one interaction with adults (Krcmar et al, 2004). More research is required on the under-twos to confirm these conclusions. Similarly, the above research on pre-schooler vocabulary development concentrated on receptive vocabulary development at the word level and demonstrated that there are gains here. The studies did not provide data on children's comprehension at the sentence rather than word level. More research is required on this question of television's relationship with receptive language more generally in order to understand the implications for higher-level vocabulary development.

The suggestion made by Rice, Huston, Truglio and Wright (1990) that vocabulary learned from television does not require adult input, needs qualifying. It would appear that learning meanings of familiar words does not require adult input compared to learning unfamiliar words and meanings. In all other natural language learning conditions, language competency is associated with adult input (Weizman and Snow, 2001; Hart and Risley, 1992). Language specialists Weizman and Snow (2001) have argued that children's improvement of vocabulary largely depends on "lexically rich, naturally occurring conversations early in life." They identified mealtime and playtime instead of shared book reading as the main contexts when "interesting, engaging, and vocabulary-expanding conversations" occur between adults and children. Future research might compare such orally rich adult-child language interactions that promote vocabulary with language-enhancing content on television. This may help to determine the content of television as well as the quantity of viewing that benefits vocabulary growth independent of adult input.

Expressive language

Far less researched is the relationship between television and expressive language, or language output. The above studies provided no data on the transfer of knowledge from receptive to expressive language. Expressive language is defined as speaking and any communication production that is both verbal or through gestures. Early expressive language and vocabulary are both associated with higher comprehension in later literacy learning (Snow et al, 1998). Yet, only a few studies have considered the relationship between television and expressive language. What evidence is there that children's television generates verbal responses and/or extends oral language? How

confident are children in using words they acquire from television in conversations with other children and adults?

Researchers have found that television does promote children's talk. Wells (1985) noted in home observations that children made verbal responses to television and that the frequency of these utterances peaked around two-and-a-half and remained stable up to age five. Children aged 18 months have been found to respond verbally to what is going on on screen by labelling objects, imitating noises and naming characters (Roberts and Howard, 2004). Favourite programmes can provide sources of verbal routines for play (Marsh, 1999; Watson-Gegeo and Boggs, 1977) and adults can encourage more talk from pre-schoolers by using favourite programmes as references (Marsh, 1999). It has been argued that the television medium shares many of the properties of shared book reading in the kind of verbalisations (designating, questioning and describing content) that it generates between adults and children (Lemish and Rice, 1986).

Lemish and Rice (1986) identified several contributors to the quality of verbal interactions between adults and children that centred on their shared television viewing. Those from the perspective of children from birth to age three were: opportunity of the child to participate independently, the appeal of the content which was a mix between familiarity and novelty, and the continuity of the shared activity. The researchers argued that there was a greater role for programme content that encourages child verbal interactions. When children aged six months to three years viewed *Sesame Street*, for example, they were more likely to engage in TV-related talk than in situations where they were viewing general audience programmes.

More recently, Linebarger (2004) looked at the question of content as it generates talk in young children. She carried out a small study looking at the viewing of television programmes as an outcome and predictor of expressive vocabulary development in children at 30 months. The measures used included the MacArther Communicative Development Inventory word production scale, Pre-school Language Scale – 3(PLC3), using the expressive language subscale only, and Early Childhood Indicator (ECI) to observe and record children's language production during a six-minute play session with a caregiver. Single words and multi-word combinations were reported. She found that expressive vocabulary is promoted by certain children's programmes. *Blues Clues* and *Dora the Explorer* were found to encourage interaction and give children opportunities to respond. Children responded orally to conversational shows such as *Clifford* and *Arthur*, which model speaking and language interactions. *Arthur* generated single word use while Disney movies generated more single and multiple words from children. Disney movies contain dialogue, which models language, and extensive vocabulary. Where Krcmar et al (2004) also considered *Teletubbies* to inhibit receptive language in the under-twos because of the programme's presentation of excessive stimuli, Linebarger found that *Teletubbies* and *Barney* were negatively correlated with multi-word use among toddler viewers, possibly as a result of poor modelling of language.

Other research has found a negative correlation between general television and expressive language in pre-schoolers. Arraf (1990) considered the effects of the quantity of educational and general viewing on both receptive language and expressive language of 173 children aged three to five-and-a-half. The study utilised several measures including Test for Early Language Development, Peabody Picture Vocabulary Test Revised (for IQ), Hollingshead's Two-index of social position (for socio-economic status) and parent questionnaires and television logs. Children were divided into light

and heavy viewers and the subjects were stratified on IQ, gender and socio-economic status (SES) for the purpose of comparisons between heavy and light viewers from each stratum. Regression analysis (Multiple Regression Procedure) was used to analyse covariance between parental interaction, IQ, SES, gender and amount of viewing. Overall, heavy viewers (19 to 37 hours per week) had better receptive skills than expressive skills. Low SES boys, heavy viewers of general audience television such as sports, had poorer expressive language compared to girls. Consistent with studies on vocabulary development, content of programming predicted higher language scores: that is, educational television was correlated with higher language scores, while general audience programme content was correlated with lower language scores. However, as suggested by Naigles and Mayeux (2001), the problem with this study's correlational analysis is that it is not clear which variables are the cause and which are the effect so that one can not draw any firm conclusions about television's influence on expressive language development. Arraf's study does point to the need for further research on expressive language development among high viewers of general audience television. It would suggest that high exposure to programmes with poor content is responsible for underdeveloped language in some children. It may also mean that children who view television do not get enough interpersonal interaction that enables children to fine-tune and develop their speech. The suggestion that the expressive language development in low SES boys is poorer also requires further investigation.

More recently, Duffy, Fox, Horwood and Northstone (2004) have found in their longitudinal study of 6,961 children under the age of three that there is a correlation between television viewing and children's word production and comprehension. Language was assessed using the MacArthur Communicative Development Inventories at 24 and 36 months and questionnaires on children's viewing habits were collected at 18 and 30 months. Mothers were asked to report on how their children usually watched the television: while playing, watched attentively, ignored it or was not allowed to watch it. They hypothesised that those children who reportedly watch television attentively may show higher scores in word production and comprehension than those who watch it inattentively (while playing or ignoring it). It was also expected that the effect of attention to television which led to improved language would be evident as the children grew older. Instead, they found that children who did not watch television at all had the highest scores while children who watched television scored lower on language measures and these scores persisted over time. The researchers suggest that higher language scores were related to children's involvement in language activities other than television viewing. Unfortunately for the purpose of this review, the data was not available for consideration while the researchers prepared their findings for publication. Their longitudinal study is potentially important for television research in the UK and may provide new evidence on the effects of television and its implications for children's development of expressive and receptive language.

Another correlational study points to negative effects of television on speech development. In this case, Stowell (1992) conducted a small study to examine the relationship of early television viewing with communication apprehension, or anxiety of oral communication with a single person or small group. Communication apprehension can suppress normal oral communication. The condition often develops in the early years and is noticeable in many children at Reception. It may develop as a result of genetic factors but, increasingly, evidence points to the environmental and social conditions which impede interaction attempts, skills acquisition and access to good models for oral language in the early years. In a survey of college-age students in speech classes with moderate and severe communication apprehension, Stowell (1992)

found a correlation between the quantity of television viewed at age three to eight and the speech disorder. The conclusion drawn is that the respondents missed opportunities for social and oral interaction in their pre-school years as a result of extensive exposure to television (more than two hours per day). This would suggest that children may not develop confidence in their linguistic ability when exposed to high levels of television in the early years at the expense of social interactions. However suggestive these results may be, a larger study is warranted before causal relationships can be drawn.

The literature appears to be divided over the question of the relationship between television viewing and expressive language. The popular position is that educational television engages children older than two and provides language-rich opportunities for verbal expression (Lemish and Rice, 1986; Wells, 1985; Marsh, 1999). These researchers reject the displacement theory espoused by Arraf (1990), Duffy et al (2004) and Stowell (1992) that television displaces other social and language activities. Those who found television to be potentially less favourably suited for expressive language development compared to adult-child interactions (Arraf, 1990) or broader social interactions (Stowell, 1992) are a minority. These last studies draw attention to the importance of two-way interaction between adult and child that enables a child to modify his/her output and develop sophisticated understanding of language and its expression. Although the Stowell study is small, it brings to the debate on television the implications of children's confidence in their abilities for speech development through social interactions and potential speech disorders.

Overall, oral language is encouraged by quality content offered by some children's programmes, particularly those with an emphasis on educational content, but more research on long-term gains is warranted. As suggested in the section on vocabulary, more research on the differences between language learning in natural versus television conditions is required. In other words, further research may clarify the extent that television and even digital interactive television can replicate the linguistic exchanges, naturally occurring conversations, explanations of meaning and oral modelling offered by adults that extend children's expressive language. Moreover, more research is needed on the expressive language development of viewers under the age of two.

Grammar development

Along with being a skill associated with written language, grammar is also an oral language skill which evolves through hearing spoken language. In this sense, it is the segmentation of the stream of sound children hear to form words and word order (subject, verb and object). The Naigles and Mayeux (1991) review mentioned above found that television has less input in children's grammar development than vocabulary. They propose several reasons for this. The negative effects on grammar may be related to the lack of opportunity for participation/interactivity of television, or because learning grammar cannot take place in a short time span; or television might be similar to maternal influences on language development and, similarly, not yet understood. The authors conclude that natural language influences rather than television are more important, particularly for children aged two to three.

They suggest that the absence of evidence that grammatical knowledge is acquired from television is partly related to the fact that there have been very few studies on the subject. Moreover, they argue that research that has been carried out has looked at

inappropriate aspects of grammar for the age groups studied. Much of the research has focused on children aged three to five. This age group is typically “mastering passive voice, complex multiclause sentences, negation, and anaphora [use of words like pronouns that refer back], whereas the measures investigated by most researchers – word order, general sentence complexity, modals and imperatives – are typically acquired by children between the ages of two and three.” (p.141) The researchers point out that research should concentrate on measuring age-appropriate skills in connection with grammatical development.

Overall, it appears from their review that very little work has been done on this area to confirm any benefits of television for children’s grammatical development. More knowledge of grammatical development in children under two would be useful as they are increasingly encountering more auditory information from different media.

Pre-literacy skills: phonological awareness, narrative and storytelling, and knowledge of literacy

The pre-literacy skills associated with oral language development of phonological awareness, narrative and storytelling, and knowledge of literacy have received very little treatment in television research on pre-school children. For this reason, these skills have been grouped under one heading.

There is evidence that children learn some letter-sound knowledge from *Sesame Street*, which is useful when children begin to decode words (Zill, 2001). By the age of three, children begin to acquire the capability for learning about the phonological structure of spoken words. It has been suggested that *Sesame Street*, which targets ages three to five, and other children’s programmes do not do enough to promote phonological awareness or knowledge about literacy (Mates and Strommen, 1996), but this claim has not been substantiated by other studies. Most children’s educational programmes incorporate games, songs and poems that emphasise rhyming and some manipulation of sounds which, in theory, should draw attention to the phonological structure of spoken words (Snow et al, 2001). The potential for developing phoneme-grapheme correspondence from television has been recognised but not proven (Marsh, in press). Television research has not yet examined the implications or effectiveness of televised instruction for raising phonological awareness in pre-schoolers compared to adult-child instructional interactions. It is clear from research on *Sesame Street* that educational television can play some role in developing this knowledge but more evidence is required to show that it is sufficient for enabling children to acquire the skill.

Pre-school children are also expected to acquire knowledge of narrative and storytelling before they enter school if they are to avoid literacy difficulties (Wells, 1987). Research has found that the ability to repeat or recall sentences and brief stories predicts reading achievement (Snow et al, 1988, p. 109). Being capable of explanatory talk is also found to be critical for later literacy development (Crain-Thoreson and Dale, 1992). As already mentioned, television has been found to promote children’s talk (Roberts et al, 2004) and imaginative play (Marsh, 2004). Four-year-old viewers of *Sesame Street* were found to be able to tell connected stories when pretending to read (Zill, 2001, p.120). Marsh (2004) has also found that favourite entertainment programmes such as *Teletubbies* encourage role play in children who dress and act like favourite characters or use toys to act out favourite narratives. ‘Televised texts’ which are favourites in the home also encourage more adult participation in children’s play. This is important given

that language specialists emphasise that opportunities for verbal interaction in the home that centre on literacy predetermine a child's degree of risk of reading difficulties (Snow et al, 1998). As Marsh repeatedly argues, research in education is just barely beginning to understand the opportunities offered by media to encourage children's language and literacy development (Marsh, 2004).

Marsh (2004, in print) has looked mainly at children's uses of televised content in the construction of their own narratives rather than measuring the comprehension of televised narrative. Noble (1975) argued that pre-school children are incapable of understanding narrative or stories from television. They perceive televised events as separate and fragmentary incidents rather than as an integrated sequence. This limits comprehension of content and limits memory store of information (Arraf, 1990; Snow et al, 1998). This is particularly true of complex narratives portrayed in adult programming. Children's programming has since incorporated simpler narratives for digestion by the younger audience. The Marsh (1999, 2004) and Lemish et al (1986) research would suggest that children are understanding some televised narratives and stories that are designed for them and that these narratives are encouraging storytelling and explanatory talk in the same way as shared book reading. Educational programming has also aimed to elevate knowledge of texts and literacy as in the programmes *Barney and Friends* (Guofang, 1999) and *Reading Rainbow* (Wood and Duke, 1997), which offer content on reading books and raising children's knowledge of books. This is important since researchers at the University of Sheffield have also suggested that pre-schoolers who develop an ability to talk about texts become familiar with literacy and have greater success with learning to read once they enter school (Hannon, 2000; Hannon, Weinberger and Nutbrown, 1991).

Overall, it appears as though educational programming aims to develop children's knowledge of letters and sounds, and knowledge of narrative and storytelling. Some children's entertainment programmes may also develop children's storytelling capability. Television can raise knowledge of text and literacy if book reading is included as part of the content. More evidence about how effective television is at promoting phonological awareness is warranted.

Evidence strongly suggests that television is promoting talk in imaginative play and children's own storytelling related to favourite programmes and characters. In this regard, television can be seen as an effective medium for encouraging children's capacity for storytelling and explanatory talk.

2.1.2 General audience television

There are only a few studies that have looked at the implications of general audience programmes (commercial cartoons for older children, family sitcoms, news and documentaries, sports, etc) for language development in the early years. Earlier research on general television viewing pointed to the need for more educational content (i.e. Singer and Singer, 1984). In this regard, general viewing can represent either non-educational content or overall quantity of viewing. In either case, the consensus among researchers is that general audience programmes do not enhance language and, in some cases, have been proven to be associated with low language ability. Because the question of overall quantity of viewing is among the questions investigated in this review and is addressed in section 2.3, this section will concentrate mainly on research findings concerning non-educational content rather than quantity of overall television viewing.

The question of content, along with age-appropriateness of the content viewed, has already been identified in educational television research as being an essential determinant of young children's language learning from television. The same research points to a correlation between non-educational content and poor language ability.

Bickham et al (2001), who carried out the Early Window Project, included alongside their investigation of the effects of educational television, the viewing of general audience adult entertainment and commercial non-age-appropriate cartoons by the pre-schooler audience. They found that general viewing in ages under five was associated with children's poor academic achievement and low school-readiness scores. Children with good language skills at age five tended to have watched more educational television such as *Sesame Street* and fewer non-age-appropriate cartoons throughout primary school than children with poorer skills. Increased vocabulary was linked to *Sesame Street* but not to viewing non-educational content (Rice, Huston, Truglio and Wright, 1990). Selnow et al (1982) also found that children who used less sophisticated language tended to view more language-poor programmes such as cartoons and family drama programmes than other children. Arraf (1990) also found a correlation between viewing general audience programmes (sports, cartoons, news/documentaries, family drama, action adventure, comedies and games) and poorer language scores. Children's expressive language was particularly negatively affected (Arraf, 1990).

Bickham et al (2001) argue that in order for language skills to develop from television, the content of programmes must be age-appropriate as children do not comprehend information from general audience programmes or cartoons aimed at the older audience. Anderson et al (1976) also noted that children will not attend to television when content is incomprehensible so that they will not benefit from auditory or visual information being conveyed by the television.

The other aspect of general audience viewing is that it implies a preoccupation of the adult with the television rather than the child. Arraf (1990) and Bickham et al (2001) suggested that although parents may be co-viewing general audience programmes with their children, they are not available for conversation or for providing explanation of material being covered in the programmes in order to further children's comprehension of content. Moreover, parents who are positive about television more generally are less likely to engage their children in other activities (Rice et al, 1990).

It is not necessarily the case that adult attention to television will restrict language interactions with children. Lemish et al (1986) found that general television will encourage some adult-child talk. However, programmes such as *Sesame Street* elicited more dialogue than non-educational television because the content was appealing to both adult and child and gave reasons for the adult to sustain the child's participation in the activity. They also noted that labelling will occur in children without specialised circumstances but found that content does in fact enhance the language-learning experience.

Research currently favours the view that content and message delivery determine language opportunities offered by television. General audience television does not appear to offer the same opportunities as age-appropriate educational television that models language or uses new and familiar words. Children who view non-educational content tend to have lower vocabulary (Rice et al, 1990), poorer expressive language

(Selnow et al, 1982; Arraf, 1990; Duffy, 2004) and to engage in less TV-talk with adults (Lemish et al, 1986).

2.1.3 Conclusions about what is known about the relationship between television and language development

Children under two: The literature suggests that research is divided about whether or not children under two benefit from the television medium. Some evidence suggests that children at 18 months will attend to television for brief periods and respond verbally to television, especially when exposed to high-quality educational programmes. These responses may imply that learning is taking place, although what children are understanding from television content is far less certain. Other evidence suggests that children under 22 months may not benefit from the television medium at all, as found in the case of *Teletubbies.* Instead, interaction with adults was found to have better results in raising infant comprehension (imitation). Extensive exposure to television may mean that interaction with adults is reduced. At 24 months, evidence would suggest that children can acquire some information. In all cases, the individual characteristics of the child, such as age and linguistic maturity, will determine how a child will respond to television and what he/she will acquire from it.

Children aged two to five: The literature suggests that children aged two to five can benefit from television, depending on the quality of the programme content, the age-appropriateness of the content, opportunities for interaction and co-viewing with adults. Children in this age group can develop comprehension, receptive vocabulary, some expressive language, letter-sound knowledge, and knowledge of narrative and storytelling. Children can also increase their understanding of familiar words from television independent of adult co-viewing, while co-viewing enhances oral ability and comprehension of unfamiliar words. There is a lack of evidence that children develop grammar, phonological awareness, and knowledge of literacy, but this is largely related to the paucity of literature on the subject.

Television's relationship with expressive language also needs qualifying. Although there is evidence that television provides opportunities for verbal interaction, explanatory talk and storytelling, there is also evidence that children who have high exposure to television have lower expressive language scores and may not develop confidence in speaking. Children's programming can enhance expressive language by encouraging talk but more evidence is required to demonstrate long-term effects. And, although there is a correlation between low expressive language scores and television viewing, specific cause and effect relationships have not been identified.

Several questions still remain:

- Are there are any risks that auditory stimulation from television may inhibit infant vocalisations?
- Are the risks for language different when children are attending to television compared to when they are exposed to background media?
- Is poor programme content or quantity of viewing responsible for poor expressive language? Or, is it the nature of the medium, which might not be sufficiently interactive compared to interpersonal interaction with an adult?
- How effective is television at promoting phonological awareness?

2.2 The characteristics of television programmes that stimulate or hinder language development in their target audience

The review considered the characteristics of quality programming and of an optimal viewing experience for early language development. This section will highlight some of the features of television that contribute to beneficial (or unsatisfactory/harmful) television viewing from the point of view of language and literacy development. The emphasis is on the nature of supervision and interaction by carers during viewing, the location of the television in children's households, i.e. their bedrooms, and differences between video and television viewing.

2.2.1 Main factors influencing viewing experience

The review has already noted that programme content and message and opportunities for interaction are important factors for language acquisition. The factors that have emerged in the review thus far that promote positive viewing experiences include:

- little visual or auditory stimuli (infants). The Krcmar et al (2004) research on infant language acquisition and television found that children did not learn novel words from television as effectively as from an adult speaker on video. Better results have been noted for age-appropriate programming with low stimulus input such as an adult speaker (Rice, 1983, 1984)
- balance between novel and familiar words (Rice et al, 1988; Rice et al, 1990)
- interesting material for adults to encourage co-viewing during educational programmes (Rice et al, 1988)
- use of sophisticated language (Selnow et al, 1982)
- formats that offer possibilities for interaction (Linebarger, 2003) and participation through songs and questions (Rice et al, 1990)
- age-appropriateness of the material – *Sesame Street*, for example, is best suited for three to five-year-olds. Younger and older children are less likely to benefit (Rice et al, 1990).

Negative viewing experience of television has been related to:

- high auditory and visual stimuli that are less effective for the under-twos (Krcmar et al, 2004)
- complex narratives that are not understood by young children (Grant, 1975)
- presence of older siblings who prevent younger children from experiencing the benefits of educational television (Pinon et al, 1989)
- language-poor content of programmes in commercial cartoons and adult programming. Some children's programmes have also been found to elicit simple verbal responses in children at 30 months, such as *Teletubbies* and *Barney* (Linebarger, 2004)
- extensive co-viewing with adults of adult programming, which is associated with low language development, high exposure to television more generally and low exposure to educational programmes (Rice et al, 1990).

2.2.2 Nature of supervision and interaction by carers during viewing

There is ample evidence in language research that there is a strong correlation between home environments and cognitive and language outcomes (see Bradley and Caldwell, 1976; Snow et al, 1998). The level of interaction and verbal support provided by caregivers predetermines language ability on school entry. This section looks at the question of adults co-viewing television with their children and the potential benefits this may have for helping children's language acquisition.

St Peters, Huston and Wright (1989) found that co-viewing is not always used for instructional interactions. Moreover, the study revealed that the nature of co-viewing changes with time. A small percentage of parents co-viewed child programmes (educational and entertainment) with children aged three to four (22 per cent compared to 75 per cent co-viewing adult programmes). Cupitt et al (1989) also found that co-viewing declines with age. St Peters et al (1989) also found that co-viewing action-adventure programmes with parents increased over time. This latter is associated with negative effects on children's use of print media (use and enjoyment of books, magazines and visits to the library). They found also that co-viewing of television is not necessarily associated with vocabulary acquisition from television. Improved vocabulary occurs independently of parental intervention when children are exposed to age-appropriate educational programmes as well as to programmes pitched at a child's language level. Rice and Woodsmall (1988) also concluded that pre-schoolers acquire new words with minimum of exposure and tutorial assistance while viewing television.

Other studies suggest that there are positive correlations between parental input/co-viewing and children's language. The Naigles and Mayeux (2001) review suggests that when children are exposed to too many unfamiliar words in a programme, children may benefit from adult co-viewing. Co-viewing has also been found to enhance children's comprehension and understanding of television content (Lealand, 1995). Arraf (1990) also found that parent-child interaction improved television viewing experiences and was found to be the best predictor of receptive and expressive language. This is supported by Lemish and Rice (1986) who found that younger children's oral abilities are enhanced by children co-viewing educational programmes such as *Sesame Street* with parents. Age-appropriate programmes also encouraged active participation of parents on issues such as naming and identifying objects, repetition of words, asking questions etc.

2.2.3 Location of the television in children's bedrooms where there is likely to be no parental supervision

This is a recent phenomenon since the 1990s – partly explainable by cheaper electronics, increased media access, and the entrenchment of television in family culture. What research into this new phenomenon has shown thus far is that:

- children under two have televisions in their bedrooms. For children under two, Rideout et al (2003) found that one-quarter of their sample of American children (26 per cent) have a television in their bedroom. Another study of 272 American families with children aged one to 36 months found that 28 per cent of children had televisions in their bedrooms (Dalzell, Msall and High, 2000)

- television location predetermines level of co-viewing with adults. The location of the television in a child's bedroom means that co-viewing is less likely to take place (Lealand, 1995)
- availability of television increases viewing (Anderson et al, 1986).

2.2.4 The different benefits/implications between viewing new content on television and the repetition of familiar favourites on a video

Most of the research in this review considered television viewing of aired programming rather than video viewing. Videos are widely used by families, thereby increasing the time exposed to the television medium (Rideout et al, 2003). The widespread practice of video viewing raises the important question of the known differences between viewing new content on television and the repetition of familiar favourites on video.

To a certain extent, educational television already seeks to find a balance between new and familiar content. Children's educational television is aired with a view to being repeated regularly to encourage children's memory and familiarity with content. The difference with video, however, is that video offers more possibility for frequent repetition of familiar favourites within a day.

One small study found that language is learned effectively by way of video and repetition. Rice and Sell (1990) recorded 20 children aged two to five viewing four *Sesame Street* videocassettes in their home and collected information from parents on the use of video in the home. They pre and post-tested children's cognitive skills using the Brigance K & 1 Screening for Kindergarten and first grade, the Brigance Diagnostic Inventory of Basic Skills (numeracy section) along with other measures for assessing skills acquired by video. Gains were reported in children's vocabulary, letter and number recognition and printed word identification. From the video records of children's viewing, the researchers noted that "children talk about the cassette, they label the characters and things, and they repeat parts of the songs and dialogue." They also found that parents interacted with children while viewing by commenting on the tapes and "[relating] the tapes to other experiences of the child." (p. 45)

The findings of Rice et al (1990) would suggest that videos offer opportunities for greater interaction and repetition of material. While these findings are promising, more research is required in this area, particularly now that video use is common practice.

2.2.5 Conclusions on the characteristics of television programmes that stimulate or hinder language development in their target audience

- Optimal viewing experiences differ for each age group and each language category. Vocabulary has received the most attention in research and is enhanced by age-appropriate content, exposure to new and familiar words, frequent exposure, possibilities for interaction and some adult co-viewing.
- There is still some need for research that looks into potentially harmful effects, if any, of television formats on language development, particularly for the under-twos.
- There is uncertainty about the nature of supervision and adult co-viewing required to provide optimal viewing experiences. There is evidence that age-appropriate educational programming can teach some vocabulary independent of adult co-viewing. However, co-viewing may also enhance comprehension, oral language

ability and talk about content. Under-twos may specifically benefit, although more research is required to find out specific benefits.
- Adult supervision and co-viewing are affected by the location of the television in children's bedrooms. More research is required into the relationship of the bedroom location with children's time viewing independently of their parents and their language development.
- There is some evidence that video use has positive implications for language development, although more research is required as usage increases.

2.3 The quantity of television that enhances or detracts from language development

Apart from identifying research on the relationship between television viewing and language development, the review sought to identify research on the implications of the quantity of television viewing on language development and whether parents can mitigate the negative effects of television quantity. This section looks at the first part of this question of quantity on the optimal quantity/frequency of television viewing for children's language development and, conversely, any adverse effects of excessive or insufficient television viewing on their language development. Section 2.4 will consider parental/caregiver roles in mitigation.

2.3.1 Children's consumption of television

The research points to growing television consumption world-wide (Rideout, Vandewater and Wartella, 2003; Livingstone, 2001). There are several factors that correlate with children's consumption of television that have been raised in the literature.

Research suggests that viewing increases with age. Children aged two-and-a-half to three are viewing approximately 1.5 hours per day (Huston et al, 1983), increasing to 2.5 hours by age three to six. There is a decline of about half-an-hour between age five-and-a-half and seven as children enter school (Huston et al, 1990). Viewing times increase with age, up to three years: children under one watch 22 minutes of video and 53 minutes of television per day; one-year-olds watch 40 minutes of video and 73 minutes of television; two-year-olds watch 67 minutes of video and 97 minutes of television (Dalzell et al, 2000).

The availability of television increases children's viewing. Anderson et al (1986) found that when the television is available for viewing, the percentage of children's viewing time increases from six per cent at age one to 67 per cent at age three to four, and 70 per cent for five to six-year-olds. The correlation between availability or accessibility and high television viewing was confirmed in a 2003 national survey in the US carried out for the Kaiser Family Foundation. The survey, which interviewed 1,000 parents about the television exposure of children aged six months to six years, found that half (50 per cent) the children have three or more televisions in their home, and one-third (36 per cent) have a television in their bedroom. For children under two, they found that 43 per cent watch television every day, and one-quarter (26 per cent) have a television in their bedroom. Children in 'heavy TV households,' where television is on most of the day, even when no one is viewing, are more likely to start watching television before they are

one (42 per cent compared to 28 per cent in other households), to watch every day (77 per cent compared to 56 per cent in other households) and to watch for longer than other children (approximately 34 minutes more per day) (Rideout et al, 2003). Another study of 272 American families with children aged one to 36 months found that 28 per cent of children had televisions in their bedrooms (Dalzell, Msall and High, 2000).

Family background and individual characteristics are associated with quantity of viewing. High exposure to television is correlated with the educational level of caregivers (Koutsouvanou, 1993). The Kaiser Family Foundation survey found that there is a correlation between parents' educational background and heavy television viewing. Heavy viewing was associated with homes where parents did not hold a college degree (Rideout et al, 2003; Certain and Kahn, 2002). Parent age is also a determining factor in quantity of television as younger parents have been found to be more likely to expose their children to high levels of television (Dalzell et al, 2000). Low IQ in pre-school children has been found to be associated with higher exposure to television. Arraf (1990) suggested that children with poor language ability may be drawn to programmes with poor language content as well as to general audience viewing, which is associated with higher exposure to television more generally. Socio-economic status of the family has also been linked to high exposure to television, with low status being a predictor of heavy television viewing in the pre-school years (Arraf, 1990; Dalzell et al, 2000). Gender may also play a role in viewing quantity as boys have been found to be higher viewers of general audience programming while girls are higher viewers of educational television (Arraf, 1990).

The ecology of the home affects the quantity of viewing among pre-schoolers. Pinon et al (1989) found that family time with television, mothers working and siblings affected quantity viewed rather than the individual characteristics of the child. Children who spend more time at home instead of nursery or pre-school have more exposure to both educational and non-educational television (Pinon, Huston and Wright, 1989; Homberg, 1978). Older siblings who have outgrown *Sesame Street*, for example, have been observed preventing their younger siblings from viewing it. The implications are that later-born children get less exposure to the benefits of educational television (Pinon et al, 1989).

Quantity is also affected by parental views on the role of television. Parents believe that this media will enhance their children's imagination and help with recognition of letters and numbers (Dalzell et al, 2000). Parents also believe that television will improve their children's vocabulary (Certain and Kahn, 2002). Homberg (1978) previously found that mothers believed that children's programmes such as *Sesame Street* and *Playschool* provided desirable learning opportunities for children and wanted more programmes with similar content.

Parent-child television interaction is also correlated with quantity. There is evidence of decreased parent-child television interaction among high viewers of general audience television and low viewers of educational television (Arraf, 1990). High levels of parent-child co-viewing also correlate with high exposure to general audience television more broadly and poor instructional interactions overall (St Peters et al, 1989).

2.3.2 Children's television and quantity of viewing

Researchers have suggested that viewing more educational television than general television is linked to higher language scores. This is understood to mean that higher frequency of viewing educational content correlates with higher language ability at school entry. But quantity, or time spent viewing, educational television has not been shown to have any significant effect on language outcomes. Instead, as noted above, educational content and message is found to have greater effect. Researchers generally encourage more viewing of high-quality educational programming (Rice et al, 1990; Wright et al, 2001).

The research suggests the following:

- children in childcare or at pre-school have fewer opportunities to watch educational television (Pinon et al, 1989)
- older siblings negatively influence young children's exposure to educational television (Pinon et al, 1989)
- socio-economic status is a determinant in whether a child might watch educational television but is not a determinant in quality of experience. That is, children of low SES background benefit just as much as middle class children (Rice et al, 1990)
- children with poor language ability have been linked to low quantity of educational television viewing (Wright et al, 2001)
- boys may also be infrequent viewers of educational television (Arraf, 1990).

2.3.3 General audience programming and quantity of viewing

High exposure to general audience television has been linked to poorer language levels overall (Wright et al, 2001). As with children's television, no studies have demonstrated, however, that time viewing as opposed to quality of content is responsible for low language ability in children who have high exposure to general audience programming. Wright et al (2001) attributed low language scores in pre-schoolers who watch general television to the programme content rather than to time spent watching (Arraf, 1990). They noted a correlation, however, between those who watch 25 minutes of educational television and increased language development, and those who watch a lot of commercial cartoons and general audience television and low language development. Other factors that may be associated with high quantity of general viewing and children's language abilities are low socio-economic status, educational level of caregivers, age of parents, parental beliefs about television and education, and ecology in the home. Researchers have not yet demonstrated conclusively that these other factors are not responsible for poor language ability in children exposed to high levels of television.

As mentioned in section 2.1, children's attention to television has been studied fairly extensively. It has been found that high exposure to television does not mean high levels of attendance among young children. Instead of attending to television content that is beyond children's language abilities, children involve themselves in other activities (Anderson et al, 1976). Children who involve themselves in other activities while the television is on have been found to have higher language scores compared to those who view attentively (Duffy et al, 2004). Yet, little research has not investigated the implications of high exposure to incomprehensible content or television as background stimulation over time. Singer and Singer (2001) have expressed concern

that background television does displace imaginative play and other activities associated with language development. Anderson and Evans (2001) have expressed the concern that very little is known about the cognitive processes and developments affected by background television, which may interrupt children's private thought processes and speech utterances.

Two studies in England have looked into the question of whether or not background noise from television is responsible for poor language ability in young children. One study found that noise was not to blame for poor language ability compared to low parent interaction (Alston and St James-Roberts, 2003). Alston et al (2003) studied at-risk children of middle-class Caucasian and middle socio-economic status households. They found that infants at-risk at 10 months who failed the WILSTAAR screen for language difficulties were found to engage in and experience less social interaction and communication with parents. They babbled a third less frequently than non-at-risk children. Television was also found to play no direct role in higher levels of noise in the home environments of at-risk children as it was off in most cases when the researchers were present. Instead, Alston et al (2003) suggest that television and video may have an indirect effect on children's language by distracting parents from interacting with their children. Previously, it has been suggested in research among inner-city children at risk of language difficulties that background noise may be a factor in language difficulties (Ward, 1999). Ward (1999) had hypothesised earlier that children who failed the WILSTAAR screen for language difficulties and were classified as at-risk, and who were from low socio-economic classes, were exposed to high levels of environmental noise from extensive television viewing in the home. While Alston et al (2003) disprove the 'environmental' theory and highlight the significance of insufficient parental input in infant language acquisition for middle-class children at risk, more research is needed to disqualify socio-economic differences in the contribution of high exposure to television to language delays. Furthermore, the effects of high exposure to television requires further research.

2.3.4 Conclusions on the quantity of television that enhances or detracts from language development

As noted above, some studies have traced poor language ability in pre-schoolers to high exposure to adult programmes and children's entertainment programmes such as commercial cartoons (Arraf, 1990; Duffy, 2004; Lemish et al, 1986). Some research, however, has found that children's entertainment programmes are not necessarily harmful for language development per se (Linebarger, 2004; Lemish and Rice, 1986) but that there is a correlation between children who watch a lot of commercial cartoons and high exposure to television more generally (Wright, 2001). High exposure in this sense is correlated with low language ability.

It is not clear from the research what happens in situations where children are not attending to television which is on for long periods during the day (Anderson and Evans, 2001). In other words, what cognitive and linguistic processes are being affected by high exposure to background stimuli and what are the implications for language development? Similarly, more research is required on the implications for language when parents are distracted by television and other media for extended periods during a child's early years. Other research has demonstrated that carer responsiveness to children correlates strongly with language and literacy achievement (Crain-Thoreson et

al, 1999). These findings need to be investigated in the domain of television and media research.

Research has also not identified whether in the case of high exposure to high-quality educational television, quantity of viewing positively or negatively affects language outcomes. This question of whether there are higher or lower gains associated with extensive educational television viewing is an important one now that educational television, as well as children's entertainment television, is a growing industry and readily accessible throughout the day. This means that children spend more time viewing television.

More research is also required to understand socio-economic differences associated with quantity of viewing and language outcomes. Are language outcomes attributable to factors such as low socio-economic status, parent education and values, and parenting styles or to television quantity among low socio-economic status families?

Overall, there is much need for research that examines the optimal quantity of television for children in the early years: how much television, educational and otherwise, is too much?

2.4 The kinds of activities in the home that maximise benefits and minimise the adverse effects of television

The review sought to identify in greater detail the role of parents/carers in maximising the benefits and minimising the disadvantages of television. In other words, how can parents and carers ensure an optimal viewing experience (as identified above) and an optimal viewing quantity of television. Interestingly, carer roles in children's television viewing have not featured prominently in the literature. Research has also failed to identify the optimal quantity of television for children from birth to age five. A careful reading of the literature would suggest that carers can do the following to ensure optimal viewing experience and to regulate quantity of viewing:

2.4.1 Providing an optimal viewing experience (as identified above)

- select high-quality, age-appropriate educational programming in television and video formats
- select programmes that offer opportunities for verbal responses and that offer a balance between familiar and new content
- select children's educational programmes that can be enjoyed by both adult and child, as shared interest will promote talk and conversations
- research has not demonstrated that the under-two age group benefits. It has been suggested that infants might attend to television programmes containing low stimuli such as a single adult speaker
- ensure that younger siblings get some exposure to age-appropriate educational programming
- interact with children while viewing in the form of sharing a book. Carers should encourage children to talk about content, label objects and question content
- explain and model use of unfamiliar words discussed in programmes
- use videos to repeat content. This will enhance new and familiar word learning

- locate the television in a room where co-viewing is likely to occur.

2.4.2 Regulating the quantity of television viewing

- until research demonstrates that children under two benefit from television, limit exposure and encourage other one-to-one language-enhancing activities that centre on talk at mealtime, bath time, shared reading and imaginative play
- encourage exposure to some high-quality, age-appropriate educational television for children aged two to five. Assuming that age two to three is a key time for language learning from television (Wright et al, 2001), more exposure at ages two to three would be appropriate
- choose children's programming, particularly educational programming, which offers optimal learning opportunities
- limit children's exposure to general audience television, particularly adult programming
- reduce the amount of adult viewing of general audience programmes as this will limit children's exposure to television and liberate time for carers to interact with their children
- make the television less readily available in the home. This may mean locating the television in an area supervised by adults and/or in a room where children do not do most of their playing.

3. Conclusions

The study set out to provide information on the following questions:

"What does international research tell us about the relationship between television viewing by children under five and their language development?"

"Is there any evidence about the quantity of television viewing and the role of parents and carers which would be helpful in either maximising the benefits (or mitigating the dis-benefits) of television viewing in the birth-to-five period?"

The review has found the following, taking each question in turn:

Question 1: "What does international research tell us about the relationship between television viewing by children under five and their language development?"

There is evidence that language learning from television depends on:
- the age of child
- the linguistic maturity of the child
- the age-appropriateness of the content
- the quality of content viewed
- the amount of television viewed
- the involvement of parents during viewing.

Evidence suggests that children between the ages of two and five learn language from good-quality educational television. Studies have shown that children develop comprehension, vocabulary, some expressive language, letter-sound knowledge, knowledge of narrative and storytelling. Evidence was particularly strong for vocabulary, which is enhanced by watching programmes such as *Sesame Street*. Children's grammar does not appear to benefit and there is no available evidence that television develops children's phonological awareness and knowledge of literacy to any great extent. It is important to note that these findings relate specifically to the 'average' child with 'normal' linguistic competence rather than those with learning needs or who are 'linguistically backward' (Fisher, 1984). It is therefore not clear from the literature the extent that children who are linguistically underdeveloped benefit from television compared to other one-to-one activities.

Although children's television appears to encourage two to five-year-old's oral language development by promoting talk and other verbal interactions, long-term effects for expressive language have not yet been established. There is promising evidence that children are developing the capacity for explanatory talk and knowledge of narrative and storytelling, which are skills associated with the oral language strand of pre-literacy (Hannon, 2000). Yet there is also evidence that children's expressive language scores are poorer when they watch general television in high quantity. The literature is divided between those who argue that high-quality content offers ample opportunities for developing oral language and those who argue that television impedes language development by displacing other social and interpersonal activities that are more language enhancing. Future research should examine whether poor programme content and/or quantity of viewing are more clearly associated with poor expressive language in pre-schoolers. Similarly, research has not yet determined whether poor expressive language is related to the nature of the medium, which might not be sufficiently interactive compared to interpersonal interaction with an adult. And, although a correlation has been found between high exposure to general audience viewing and low language scores in pre-schoolers, no cause and effect relationships have been identified.

There is less evidence available for children under the age of two that the current crop of children's television promotes language development. Some evidence suggests that children (ages 18 months) can label and talk about content. Other evidence for the under twos suggests that children's comprehension and vocabulary are extended more effectively by one-to-one interaction with adults than by television and that extensive exposure to television may mean that interaction with adults is reduced. At 24 months, children can acquire some new words from television and will respond verbally to television content, however, it is not yet clear whether receptive or expressive language are extended by content to any significant extent.

Research has concentrated on *Teletubbies,* which is viewed by this age group. The programme targets children up to the age of four (Ragdoll, 2000) and is advertised as being appropriate for promoting 'learning through play' in babies and toddlers (BBC, 2004). The programme has received mixed reviews in the research literature on its appropriateness for promoting language in the under-two age group. Studies using observational analysis of children's responses to *Teletubbies* have found it to have a positive influence on children's verbal output. At 18 months, children attend to the programme because they are entertained and it promotes verbal responses as they express their pleasure in the programme (Roberts et al, 2003). Similarly, the programme generates talk, imaginative play, and encourages children's construction of narratives

(Marsh, 1999). In contrast, studies involving measures to predict language production have found that children learn very little from the programme. Children under 22 months were unable to learn first words from the programme possibly because of excessive stimuli which distracts (Krcmar et al, 2004). The programme, compared to other children's programmes, does not generate multi-word use in children at 30 months possibly because of poor language modelling (Linebarger, 2003). Taken together, the four studies suggest that more research is required to identify the language benefits on offer by *Teletubbies* and there is still uncertainty within the field of the extent that young children benefit from viewing television compared to other activities.

The review has also found that the quality and age suitability of the content viewed correlate strongly with the benefits gained by watching television. More research that compares the content of children's programmes is needed to provide some quality ratings that can be made available to parents. It would also stand to reason that there should be opportunities for parents to be made aware of the age-appropriateness of a specific programme, particularly when it is aired on television. This would enable carers to be selective and involved in choosing content for their children, and would also help carers to reduce the quantity of television viewed by their children.

Where age-appropriate educational television benefits children, general audience programming (commercial cartoons and adult programmes) correlates with poor language development in pre-schoolers. Children who view non-educational content tend to have lower vocabulary, poorer expressive language and to engage in less television-related talk with adults. This may be attributable to both content and quantity of exposure to television. More research is required for children under the age of two.

The optimal viewing experience that encourages language development is one that includes frequent exposure to age-appropriate content, to new and familiar words, and offers possibilities for interaction and adult co-viewing and teaching. Some evidence suggests that co-viewing is not necessary for vocabulary development when children are viewing high-quality and age-appropriate programming and confronted with familiar words and their meanings. Other evidence suggests that co-viewing aids oral ability and comprehension of unfamiliar words and meanings. The location of the television in the child's bedroom is also associated with fewer opportunities for co-viewing and the likelihood of increased viewing of general audience programming among children. However, children's viewing and behaviour patterns while watching television in their bedrooms has not been sufficiently researched because of the newness of the trend. Repetition of content by video has been shown to have positive results and to be associated with optimal viewing experience. The optimal quantity of video viewing, however, is yet to be identified.

Question 2: "Is there any evidence about the quantity of television viewing and the role of parents and carers which would be helpful in either maximising the benefits (or mitigating the dis-benefits) of television viewing in the birth-to-five period?"

The evidence suggests that children who are heavy viewers of television are more likely to be linguistically underdeveloped, although a direct causal relationship has not been established. Studies have found that the correlation between poor language and high exposure to television is attributable to either the quantity of viewing or the quality of programme content, or both. Meanwhile, research has still not identified the quantity of television, either educational or general audience programming, that is optimal for the

birth-to-five age group. Researchers have suggested that there are possible risks of background television on language when children are not attending. This subject warrants further investigation.

The review found that children's consumption of television increases as a result of several factors. These are:

- increasing age of the child
- the availability of the television in the home
- particular family circumstances (low education of the parents, young parents, low socio-economic status of the family, low IQ and male gender of the child)
- children's time spent in the home
- carers' positive views on the role of television
- high frequency of adult-child co-viewing of general audience programmes.

Research suggests that children aged two to five should increase their viewing of educational programming because of the potential benefits for children's language development. Studies have shown, however, that reduced exposure to educational television is associated with low time spent at home, presence of older siblings, low socio-economic status of the family, children's poor language ability and male gender.

Research has not investigated the possible effects of carers maximising the benefits or mitigating the disadvantages of television. Nonetheless, the report draws on the available evidence to suggest ways for carers to provide an optimal viewing experience and to regulate the quantity of viewing.

The optimal viewing experience is ensured by selecting high-quality educational programming in television and video formats that offer opportunities for verbal responses and a balance between familiar and new content. Content should interest both adult and child in order to promote conversation. Adults should ensure that younger siblings get exposure to high-quality programming. They should interact and talk with their children about television content, explain and model use of unfamiliar words, repeat familiar content and locate the television in a space where instructional language interactions can take place.

Judging by the research, carers should minimise the exposure to television for children under two by selecting high quality programming and engaging in other language enhancing activities. For children over two, carers can encourage some exposure to high-quality, age-appropriate educational television, although optimal quantity of viewing is not yet known. To reduce the overall quantity of television, carers can limit children's viewing of general audience programming (commercial cartoons and adult programmes), reduce their own viewing of television, and make television less readily accessible in the home.

In conclusion, it appears that more needs to be learned about the relationship between television viewing and language development in the early years, particularly for the under-twos. This review has identified many benefits of television for older children with normal linguistic competence and this offers encouragement for carers. As television becomes more interactive through the introduction of digital interactive services, there is even greater potential that television will continue to enhance many aspects of children's language development, particularly with regard to receptive language.

However there are many uncertainties about television's effects on language which require immediate attention. It would appear that we are no closer to understanding either the effects or implications of a medium that does not modify its output in response to child verbalisations on either receptive or expressive language (Fisher, 1984) compared to conversational settings. It may be that even digital interactive television, which can modify its output in some ways, may not enhance children's expressive language skills. On this more needs to be known if digital television is ever to be adapted for educational purposes. Research has also not identified the optimal quantity of television viewing and other media and the effects of sustained exposure to television while not attending. It appears from the literature that we are still some way from understanding specific effects and causal relationships, such as whether heavy television viewing actually harms language development (Snow et al, 1998). Similarly, more comparative analysis of programme content to identify the markers of high-quality content is also needed to support carer involvement in selection of programmes and management of children's time spent watching television.

For now, we can conclude that television viewing is one of many language activities that children should be exposed to on a daily basis. Television can promote talk in young children, but this talk needs to be harnessed by an adult in creative and imaginative ways if the learning experience is to extend beyond the airing of a programme. Moreover, children require listeners who respond to their television verbalisations and who modify their speech for explanation. Television should be closely monitored by parents if quantity of viewing is to be kept low. Given the uncertainty within the literature, the cautious guidance of the American Academy of Pediatrics, which advises strictly limiting the exposure of under-twos to television, seems prudent. In the words of Naigles and Mayeux (2001) – "If the environmental influences on child language acquisition were thought of as a four-course dinner, then the place of television input is as one of the options on the dessert plate." (p.150)

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