The Vocabulary Richness of Children's Television in Ireland: A Cross-generational Comparison

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Abstract

This research investigates whether the vocabulary richness of children's programming has changed over one generation, and therefore compares the programmes offered in 1992 to those offered in 2017. Three hours of programming were sourced, transcribed and coded using the Computerised Language Analysis (CLAN) software (MacWhinney, 1984). CLAN is a language analysis software originally developed for the purpose of analysing child language which allows for the detailed transcription and analysis of linguistic data, including statistical measures of lexical diversity (Pye & MacWhinney, 1994).

The total words, words per minute, vocabulary diversity, total object, action, attribute and affective-state words as well as the total object, action, attribute and affective-state words spoken in the presence of a referent were calculated and compared for the programming.

The vocabulary richness of children's television has decreased over time. The number of words spoken in the presence of referents in the programming has increased over time, with this increase being significant for action and attribute words. This pattern of findings reflects a trend in children's television towards the production of programmes of reduced lexical complexity which may facilitate children's word learning.

***Keywords**: Vocabulary; Language Acquisition; Media and Television; Input*

1. Introduction

Most children in Ireland watch television for part of the day. A survey carried out in Ireland in 2008 showed that over two-thirds of families had more than one television set, and recent data released from the Television Audience Measurement Ireland (TAM) revealed that Irish

children and adults watch more TV now than they did ten years ago. Television viewing accounted for 3 hours, 13 minutes a day of the average viewer's TV consumption in 2017, which is on average more 5 minutes a day more than 10 years ago. According to the same report, children watch an average of 90 minutes of television every day (TAM Report, 2017).

Research shows that children's linguistic and socio-emotional development can be affected by the amount of time spent watching TV and by the quality of the programmes watched (Thakkar, Garrison and Christakis, 2006). Children are spending less time playing outdoors than they did ten years ago (Pergams & Zaradic, 2008; Gubbels, et al., 2011). Further, given the amount of time young children now spend engaged with media, the amount of research in this area has increased, which has resulted in an increase in the number of educational programmes on television and the awareness of parents and broadcasters of the impact of television on children (Larson & Rahn, 2015). Our study aims to investigate whether there has been a change in the linguistic quality of children's television programmes in Ireland across one generation. The analysis of the lexical qualities of children's television programmes in Ireland shows a shift towards a less lexically rich language, in favour of a language that exhibits the features of child-directed speech.

2. The role of input in vocabulary development

Children's vocabularies expand rapidly in the first six years of life, and the linguistic input they are exposed to has been correlated with their vocabulary knowledge (Cartmill, et al., 2013). Children's vocabulary size has been associated with a high quantity of input (Hoff, 2006; La Morgia, 2016; Weisleder & Fernald, 2013) and also to exposure to qualitative rich input, which is lexically diverse (Hills, 2013; La Morgia, 2013; Newman, Rowe, & Bernstein Ratner, 2016; Onnis, Waterfall, & Edelman, 2008; Schwab & Lew-Williams, 2016). Another feature of the input that has been shown to impact word learning is referential transparency, a property which allows children to easily extract word meaning from context (Cartmill, et al., 2013).

Increased television watching is often considered responsible for the drop in adolescent academic performance over the last decade (Gentzkow & Shapiro, 2008; Munasib & Bhattacharya, 2010), however research has shown that preschool children can acquire

language skills from television which may be retained into adolescence (Gentzkow and Shapiro, 2008). The linguistic content of television programmes has been found to play a role in children's vocabulary development; however, not all researchers agree that this role is a positive one. The link between TV watching and children's vocabulary has typically been investigated by measuring the correlation between TV viewing habits as described by parents (i.e. hours of TV watched and type of programming) and children's vocabulary scores on standardised tests, e.g. *Peabody Picture Vocabulary Test* (Dunn & Dunn, 1997) or *MacArthur Communicative Development Inventory* (Fenson, et al., 1993). Some studies found television watching either has no impact on children's vocabulary scores (Alloway, Williams, Jones, & Cochrane, 2014) or has a negative impact (Dixon, Zhao, Quiroz, & Shin, 2012; Hudon, Fennell, & Hoftyzer, 2013). What broadly seems to emerge from the research, however, is the presence of a 'quality' effect. Some of the studies that find a non-effect or negative effect of television watching on vocabulary skills focus on children watching television intended for adults, or children exposed to high quantity of background television (Dixon, et al., 2012; Hudon, et al., 2013). Studies investigating the vocabulary gains from television programmes designed for children, which attempt to introduce children to novel words in a meaningful way, highlight a positive association between television viewing and vocabulary skills (Linebarger & Walker, 2005; Mares & Pan, 2013; Silverman, 2013; Zimmerman & Christakis, 2005).

Television is both an auditory and visual medium and can be easily constructed in a way that supports the concurrent presentation of auditory word forms with their visual referents. Some television producers and researchers have endeavoured to produce television in this way to create vocabulary interventions for 'at risk' populations, such as children from low socio-economic backgrounds and children at risk of language delay. An example of this approach is Sesame Street's *Word on the Street Initiative*, which was designed specifically to improve vocabulary development and early literacy skills in young children at risk of language delay (Sesame Workshop, n.d.). This programme utilised several strategies for vocabulary teaching, by repeating key vocabulary, and providing verbal and visual examples of target words (Larson & Rahn, 2015). This kind of intervention was found to increase children's vocabulary size (Neuman, Newman and Dwyer, 2011), demonstrating that television

programmes which are carefully designed can successfully enhance children's vocabulary development.

Children rapidly acquire novel words through the 'mapping' of novel word form to its meaning, from only one exposure, by hypothesizing its meaning from context (Carey & Bartlett, 1978). Rice and Woodsmall (1988) studied the receptive vocabulary outcomes in 3 and 5 year-olds watching animation designed to 'teach' specific words. They found that children fast map certain categories of words from television, such as novel object, action and attribute words, while "affective-state words were resistant to quick interpretation" (p. 426). The easiest words to learn were object and attribute words, followed by action words and then affective-state words.

Rice (1984) investigated the dialogue characteristics of six children's television programs using computer language analysis. A six-minute segment from each programme was analysed, reflecting sample sizes used in studies of mother-child interactions where similar analysis measures were employed (Rice, 1984). Total words, words per minute, immediacy of referents, number of nonliteral meanings and number of novel words were measured. They found that some television programs designed for young children provided dialogue well-suited to children's linguistic competencies and that dialogue was not always overwhelmed by visual production techniques. Rice and Haight (1985) followed on from this by analysing the dialogue of educational children's programs, with attention to the immediacy of referents, counts of emphasis, nonliteral meanings, novel words and explicit instructions as well as mean length of utterance (MLU), type token ratio (TTR), total words, total utterances and number of past, present and future tense verbs. They used the computer language analysis programme LINGQUEST for coding linguistic elements as well as for calculating specific measures such as MLU and TTR. They took 4-hour random samples directly off air of the two programmes to be analysed (Mr Roger's Neighbourhood and Sesame Street) and edited the samples down to 30-minute extracts. Their analysis found that language in child-directed television for educational purposes is in line with the constraints and modifications found in the child-directed speech of adults.

3. The study

It has been established that children have the potential to learn vocabulary from television, however there is a gap in the existing literature regarding the quality of the lexical input from television, and therefore, analysis of the nature of televised language content in children's programming is warranted. This study examines the linguistic content of children's television programmes broadcast in Ireland, to investigate the nature of lexical input children are exposed to when watching television. Since the exposure to television and other media has increased in children's lives, the study also compares the lexical richness of programmes designed for children 25 years ago to programmes offered today. In the last 25 years children have been found to watch more television (Rideout, Foehr, & Roberts, 2010), and to spend less time playing outdoors (Pergams & Zaradic, 2008; Gubbels, et al., 2011). Further, given the amount of time young children now spend engaged with media, the amount of research in this area has increased, increasing in turn the number of educational programmes on television and the awareness of parents and broadcasters of the impact of television on children (Larson & Rahn, 2015). Our study aims to find out whether this increased awareness has also resulted in an improvement in the linguistic content of television programmes designed for children.

The focus of the current study is a comparison of 'vocabulary richness'. This measure extends beyond the lexical diversity of the vocabulary in the programming offered and attempts to measure aspects of vocabulary which affect how easily new words can be learned by the child viewer, similar to Rice and Haight's (1985) study. Although lexical diversity is included as a part of the measures of vocabulary richness, analysis extends beyond this to focus on word types, some of which are more easily learned by the child viewer than others (Rice & Woodsmall, 1988), as well as how many words are presented in conjunction with their visual referent. This latter measure, which was included in Rice and Haight's (1985) work, allows for the inference of how easily the word forms from the programme can be 'fast-mapped' to their meanings by the child viewer.

4. Data and Methodology

In order to compare the language of television programmes offered to today's children and the language of television programmes of a previous generation, we selected the years 2017

and 1992 to reflect the generational gap. A generation is typically defined as period of 25 to 30 years (Cambridge University Press, 2018).

A date in August was randomly selected, and a list of children's programmes broadcast in August 1992 was found by searching newspaper archives. In 1992 children's programmes were not available on a single channel, therefore, shows were selected from different channels over a period of 3 hours. Previous studies analysing TV programmes used smaller samples of television programmes (e.g. Rice, 1984; Rice & Haight, 1985), however a larger sample was analysed in the current study as the aim was to analyse change over time, rather than simply describe aspects of current programming. The children's programming from the same date in 2017 was sourced from one single channel, RTÉ Junior. The programmes comprising the 3 hours of 2017 data are listed in Table 1.

Programme	**Duration (in schedule)**	**Country of Production**	**Genre**	**Target Age**
Kiva Can Do	10mins	Ireland	Animated-Adventure	Preschool
Signed Stories	10mins	Ireland	Animated & Live Action-Educational/Storytelling	Preschool
Tilly and Friends	10mins	UK	Animated- Friendship	Preschool
Go Jetters	10mins	UK	Animated- Adventure	Preschool
Clangers	10mins	UK	Puppets- Adventure	Preschool
I Want a Pet	8mins	Ireland	Live Action- Educational	Preschool
JollyDays	2mins	Ireland	Live Action/Puppets-Educational	Preschool
Boj	10mins	UK	Animated- Friendship/Family	Preschool
Twigín	15mins	Ireland	Live Action/Puppets-Educational	Preschool
Magical Sites	5mins	Ireland	Live Action- Educational	Preschool
Bing	8mins	UK	Animated- Friendship	Preschool
JollyDays	2mins	Ireland	Live Action/Puppets-Educational	Preschool
Charlie and Lola	10mins	UK	Animated- Family/Friendship	Preschool

Charlie and Lola	15mins	UK	Animated- Family/Friendship	Preschool
Go Jetters (repeat)	10mins	UK	Animated- Adventure	Preschool
Shaun the Sheep	5mins	UK	Animated- Adventure	Preschool
Clangers (repeat)	15mins	UK	Puppets-Adventure	Preschool
Storytime	5mins	Ireland	Live Action/Puppets-Educational/Storytelling	Preschool
Puffin Rock (Cave Campers)	5mins	Ireland	Animated- Adventure/Family	Preschool

Table 1: Selected Programmes 2017

The 1992 corpus was made up of the following programmes from three different channels (UTV, Channel 4, RTÉ 1). The programmes comprising the 3 hours of 1992 data are listed in Table 2.

Programme	**Duration (in schedule)**	**Channel**	**Country of Production**	**Genre**	**Target Age**
Rosie and Jim	15mins	UTV	UK	Live Action/Puppets-Educational/Storytelling	Preschool
Bosco	30mins	RTE 1	Ireland	Animation-Friendship	Preschool
Bobobobs	30mins	RTE 1	Spain	Animation-Adventure	Preschool/School-Age
How Do You Do	15mins	RTE 1	Ireland	Live Action/Puppet- Arts &Crafts	Preschool/School-Age
Once Upon A Time… Life	30mins	RTE 1	France	Animation-Educational	School-Age
Sesame Street	60mins	Channel 4	USA	Live Action/Puppets/Animation-Educational	Preschool

Table 2: Selected Programmes 1992

4.1. Data analysis

Each programme was transcribed using the Computerised Language Analysis (CLAN) software. CLAN was developed in 1984 by Brian MacWhinney as part of the CHILDES (Child Language Data Exchange System) project. When it was first developed, CLAN was used exclusively for the analysis of child language data. However, in the last decades the scope of CLAN has broadened significantly. CLAN has been used in the creation and analysis of a several of corpora, including CHILDES for child language ("CHILDES", n.d.), AphasiaBank for aphasia ("AphasiaBank", n.d.), FluencyBank for fluency disorders ("FluencyBank", n.d.) etc. Though CLAN has been primarily utilised for transcription and analysis of live interactions, its affordances as a software also made it suitable for the analysis of television dialogue in the current study. CLAN includes all the basic tools required for corpus analysis such as key-word and line concordance and frequency counting (Pye & MacWhinney, 1994). CLAN allows for complex and specific searches within transcripts, such as COMBO searches that find strings of text defined by the user (Pye & MacWhinney, 1994). The FREQ command also allows for the total word count of a transcript to be calculated easily (Pye & MacWhinney, 1994). Further, CLAN has built in commands that allow for easy calculation of lexical diversity, i.e. Type Token Ratio (TTR) and Vocabulary Diversity (VocD) commands (Pye & MacWhinney, 1994).

Programmes were transcribed verbatim, in full, with the exclusion of the theme song. Hesitations and non-linguistic elements (e.g. laughter, coughing, etc.) were not transcribed. Vocabulary richness was operationalised through the measurement of total number of words, number of words per minute, vocabulary diversity, the number of object words, of action words, of attribute words and of affective state words, as well as the total object, action, attribute and affective-state words spoken in the presence of a referent (Rice, 1984; Rice & Haight, 1985; Rice & Woodsmall, 1988). To allow the comparison of programmes of different lengths, the mean number of object, action, attribute and affective state words, per 100 words of programming, were also calculated. Vocabulary diversity (VocD) (McKee, Malvern & Richards, 2000) was selected over Type Token Ratio (TTR) (MacWhinney & Snow, 1990) as a measure of lexical diversity as the programmes varied in length and TTR is affected by sample size. A second stage of transcription involved coding words which were spoken in conjunction with an immediate visual referent. Words were included in this category if the referent was present as the word was spoken or within 1 second before or after.

Object, action, attribute and affective-state words were defined for the purposes of this study as follows:

Object words: concrete nouns. This excludes proper nouns, except where the name of a character or place has a descriptive function that can be understood as a word in its own right.

Action words: all lexical verbs, excluding only state experiential verbs, e.g. *doubt, know, like, want,* (as defined by Cook, 1979).

Attribute words: descriptive words, including abstract nouns, descriptive and quantitative adjectives, adverbs of degree, prepositions/spatial adjectives, adverbs of manner, excluding any affective-state words. Numbers were coded as attribute words when functioning as a quantitative adjective, e.g. "three sheep".

Affective-state words: words describing a feeling or emotion or a "facial, vocal, or gestural behaviour that serves as an indicator of affect" (American Psychological Association., 2007, p. 26).

Codes to denote each word type were inserted into the transcript, after the word to be coded, as shown in Table 3. Exemplars of object, action, attribute and affective state items from the programme dialogue are also shown in Table 3.

Word Type	**Code**	**Definition & Example (Rice & Woodsmall, 1988)**	**Example from data with codes**
Object	[object]	Concrete nouns E.g. Knife, Gramophone (Rice & Woodsmall, 1988)	*BIN: finished my ***juice*** **[object]**! From 'Bing' 2017 data
Action	[action]	Lexical verbs excluding state experiential verbs E.g. Trudge, Fall	*JOH: you ***saw*** **[action]** me ***steering*** **[action]** the boat earlier on.

		(Rice & Woodsmall, 1988)	From 'Rosie and Jim' 1992 data
Attribute	[attribute]	Modifiers- "person and object attributes" (Rice & Woodsmall, 1988) E.g. Malicious, Pretty	*CRA: ooh that sounds like a ***lovely*** **[attribute]** puffin family trip. From 'Puffin Rock' 2017 data
Affective State	[affect]	"Describ[ing] emotional states" (Rice & Woodsmall, 1988) E.g. Smug, Happy	*KID: I am so ***glad*** **[affect]** I brought my beach umbrella. From 'Sesame Street' 1992 data

Table 3: Word Type taxonomy, codes used and examples

Total words of each transcript was calculated by using the FREQ command in CLAN. This figure was then divided by the length of the programme in minutes to calculate words per minute. The COMBO command in CLAN was used to calculate the frequency of specific word types in each transcript. A COMBO command was also used to search for the number of times each code appeared within the transcript.

Random samples of approximately 500 words were selected from each condition in the data (1000 words in total) to calculate reliability. Six weeks after the word types and word types in the presence of referents in the data were first coded by the primary researcher, the data was coded again by the primary researcher. Reliability was calculated by dividing the number of agreements across both rounds of coding by the total number of agreements and disagreements in both rounds of coding. Intra-coder reliability was 94% for object words, 99% for action words and 89% for attribute words. Reliability for affective-state words was not calculated due to the low frequency of words in this category. Intra-coder reliability for words in the presence of a referent was 95% for object words, 89% for action words and 91% for attribute words.

5. Results

The analysis of the lexical qualities of children's television programmes in Ireland shows a shift towards a less lexically rich language, in favour of a language that exhibits the features of child-directed speech. The first interesting figure is the shift in total number of words spoken

in the three hours of television programming, which was 15,606 in 1992 and 12,470 in 2017, showing that the pace of dialogue has become slower. This is corroborated by the finding that the mean number of words per minute has shifted from 104 in 1992 to 80 in 2017. The analysis of lexical diversity (VocD) in 100 word samples showed that along with a decrease in number of words, there is also a stark decrease in the number of different words. The decrease in lexical diversity from 1992 (M= 99.14, SD= 13.676) to 2017 (M= 78.15, SD= 16.673) was found to be statistically significant [F (1, 23) = 8.74, p < .05].

5.1. Word categories

The comparison of word categories in the two corpora shows a similar pattern: the most common words are attributes, followed by object words, action words and affective-state words. As a result of the decrease in total number of words, the number of words in each category also shows a decrease, as shown in Figure 1.

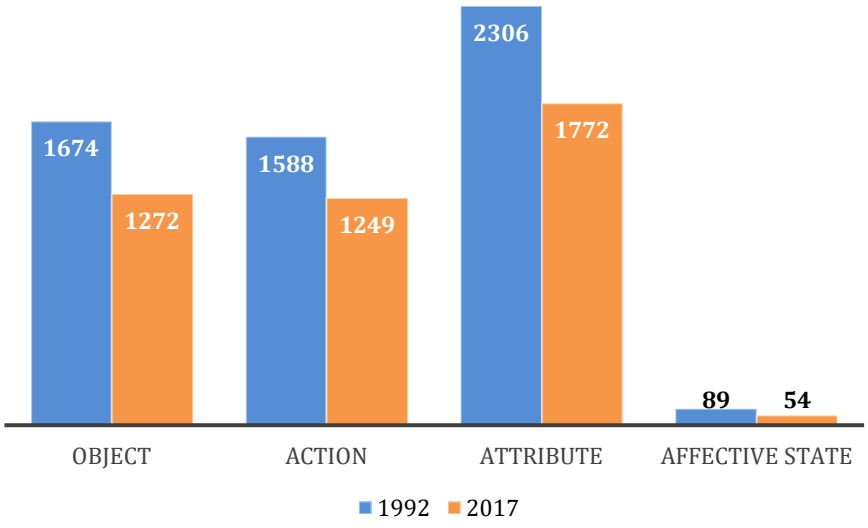

Table 1: Word Categories

The difference in word categories, between 1992 and 2017, was found to be statistically significant only for attribute words. Programmes from 1992 had a significantly higher mean number of attribute words per 100 words than programmes from 2017 at the p<.05 level (χ^2 (1, *N*= 25) = 4.42, p= <.05).

5.2. Word categories in presence of a referent

Interestingly, while programmes have decreased in lexical diversity, there has been an increase in words that are produced in the presence of a referent. A significant increase was found in the total action words presented in the presence of a referent (χ^2 (1, *N*= 25) = 5.66, p<.05). Attribute words in the presence of a referent also increased over the 25 year period. Programmes in 2017 had a significantly higher mean number of attribute words in the presence of a referent, per 100 words, than the programming from 1992 (χ^2 (1, *N*= 25) = 4.47, p<.05.

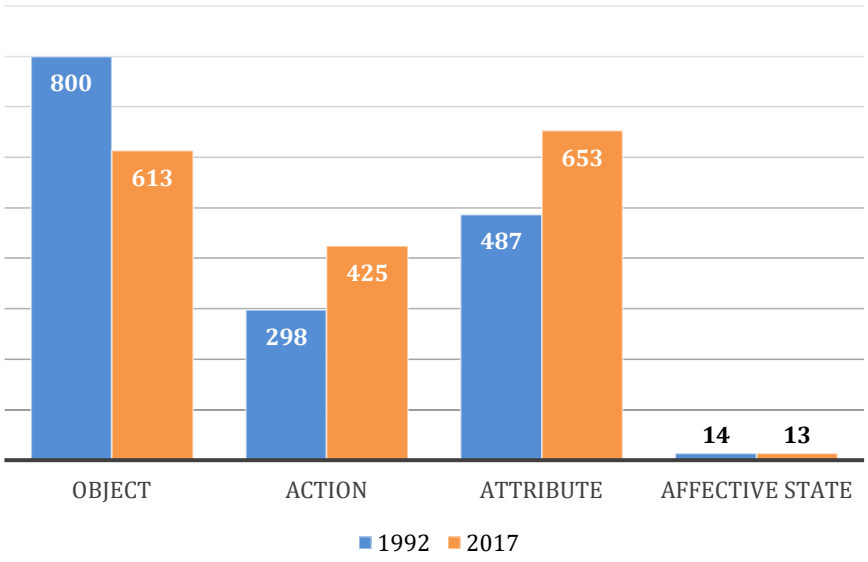

Table 2: Word categories used in combination with visual referent

6. Discussion

This study investigated the hypothesis that the vocabulary richness in Irish children's TV programmes has changed over time. The results showed a decrease in vocabulary richness from 1992 to 2017, as determined by a decrease over time in total words, spoken words per minute, vocabulary diversity, number of object, action, and attribute words. Inferential statistical analysis found this decrease over time to be significant for vocabulary diversity and the number of attribute words in the programming. The findings from this study suggest that dialogue in present-day television programming for children is less lexically demanding than it was 25 years ago. These findings may reflect the shift in children's television production towards creating programming that better suits children's linguistic competencies as many of

the lexical characteristics of the present-day programming investigated reflect modifications similar to those in adults' speech to children, known as child-directed speech. These child-directed speech characteristics include reduced number of words per minute (Broen, 1972; Grieser & Kuhl, 1988; Tommerdahl & Kilpatrick, 2015), reduced vocabulary diversity (Foushee et al., 2016; Phillips, 1973) as well as the increased number of words spoken in the presence of a referent (Cartmill, et al., 2013; Fernald & Morikawa, 1993). Further, the significant increase in action words, spoken in the presence of a referent over time, indicates that present-day programming has an increased proportion of present tense verbs, when compared to programming from the past, as referents for action words in the dialogue occur most often when the verbs are in the present tense. A focus on the 'here and now' as marked by a high proportion of present tense verbs is a well-documented feature of child-directed speech (Snow, 1986). This finding reflects Rice and Haight's (1985) claim that educational children's programs align with adjustments that occur in adults' child-directed language. While Rice and Haight found this to be true of programming from the 1980s, the present study shows that the features of child-directed speech within programme dialogue have increased over time.

Previous research has shown a positive association between television viewing and vocabulary skills (Linebarger & Walker, 2005; Mares & Pan, 2013; Rice, et al., 1990; Rice & Woodsmall, 1988; Silverman, 2013; Zimmerman & Christakis, 2005) and has highlight the link between child-directed speech and lexical acquisition (Shneidman & Goldin-Meadow, 2012; Shneidman, Arroyo, Levine, & Goldin-Meadow, 2013; Weisleder & Fernald, 2013). The repetitiveness of child-directed speech (specifically, the ratio of word types to word tokens) has emerged as the predictor of later vocabulary outcomes (Hills, 2013; Newman, Rowe, & Bernstein Ratner, 2016; Onnis, Waterfall, & Edelman, 2008; Schwab & Lew-Williams, 2016) and the results of our study show that vocabulary diversity has decreased over time, probably due to an increased repetitiveness in the dialogues. As well as displaying low lexical diversity, children's television programmes were found to also increase in referential transparency, with a statistically significant increase occurring in the number of referents provided for action and attribute words. The combination of slower pace of speech, repetition of words and use of visual referents in combination with word production make today's television programmes more suited for the promotion of vocabulary learning.

7. Conclusion

This study contributes to the understanding of the lexical demands and the potential positive effects of children's television on vocabulary acquisition. The comparison of programmes from 1992 with programmes from 2017 shows that over one generation there has been a shift in the lexical content of television programmes targeting children. The lexical diversity of the programmes has decreased, but features such as the repetition of words, the slower production of words, and an increase in the presentation of words in correspondence with a visual referent make today's programmes more conducive to vocabulary acquisition and more similar to child-directed speech. This study focused on Ireland, a country in which television viewing has been increasing in the last 10 years. The TAM Ireland TV Review (2017) reported that children in Ireland watch on average 90 minutes of television every day. Our study shows that over time the language of children's TV programmes has changed in ways that make it more understandable and that may facilitate lexical acquisition. Future research is needed to identify the nature of language acquisition that is triggered by passive television watching, and to determine whether the features of today's television programmes for children actually play a role in the vocabulary development of children in Ireland.

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