

**The Accuracy Wars: Journalists' Estimates of Continuous
Speech Product Dictation Accuracy from 1997-1999**

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Abstract

After decades of research, low-cost (relatively) speech recognition products featuring continuous speech recognition burst on the scene in the late 1990s. Competition was fierce among IBM, Dragon, L&H, and Philips. A key competitive measure was the products' reported dictation accuracies. This report documents the reported accuracies of the products of these four companies from 1997 through 1999 – the period of time in which these products received significant press. At the beginning, Dragon appeared to be the most accurate program, but by the end of 1999, IBM and Dragon appeared to be equal (and ahead of L&H and Philips).

ITIRC Keywords

Dictation accuracy
IBM ViaVoice
Dragon NaturallySpeaking
L&H Voice Xpress
Philips FreeSpeech

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Introduction

After decades of research, fairly low-cost speech dictation products hit the marketplace in the early to mid-1990s. These products (primarily Dragon System's DragonDictate¹, Kurzweil Applied Intelligence's VoicePad and VoicePro², and IBM's VoiceType Dictation and Simply Speaking³ products, released between 1993 and 1996) enabled discrete dictation. In discrete dictation, users must separate the words they dictate with brief pauses. The next major hurdle for research in low-cost speech dictation was to let users dictate continuously, with no requirement for pauses between words. Most of us in the industry expected researchers to solve the problem eventually, but many were caught by surprise at the speed with which continuous dictation products reached the market.

We first received and evaluated prototypes of the product that would become ViaVoice⁴ in mid-1997, roughly the same time that Dragon made the beta of the first version of NaturallySpeaking⁵ publicly available. By most accounts, Dragon got their continuous dictation product to market just a little before IBM released the first version of ViaVoice in August of 1997. The initial purchase price for NaturallySpeaking was \$695, but that fell rapidly after IBM entered the market with ViaVoice priced at \$199. After the initial offerings from IBM and Dragon, the typical strategy of companies offering continuous recognition products was to offer a range of products with different levels of function, typically priced between \$50 and \$200.

From the initial offerings through the heyday of competition in competitive dictation products, the primary competitive differentiator in product reviews was the reported dictation accuracy. Assessing dictation accuracy is a very difficult empirical problem because there are many things that can affect accuracy, including (but not limited to) the speaker's accent and gender, the match between the text used to initially train the recognizer and the text used to test it, the extent to which the speaker has trained the recognizer to recognize the acoustics of his or her voice, and the noisiness of the environment in which the person dictates. Despite the difficulty of obtaining a reliable and valid measurement of dictation accuracy, journalists writing about the continuous dictation products freely offered estimates in their product reviews, which very likely had a strong influence on the relative sales of the competitive products.

The purpose of this report is to provide a comprehensive review of journalists' estimates of continuous speech product dictation accuracy from the introduction of these products in 1997 through the end of 1999 (covering IBM ViaVoice, Dragon NaturallySpeaking, L&H Voice Xpress⁶, and Philips FreeSpeech). After 1999, dictation accuracy became less

¹ Dragon Systems and DragonDictate are registered trademarks of Dragon Systems, Inc.

² VoicePad and VoicePro are trademarks of Kurzweil Applied Intelligence, Inc.

³ IBM, VoiceType, and Simply Speaking are registered trademarks of International Business Machines Corp.

⁴ ViaVoice is a registered trademark of International Business Machines Corp.

⁵ NaturallySpeaking is a registered trademark of Dragon Systems, Inc.

⁶ L&H and Voice Xpress are trademarks of Lernout & Hauspie Speech Products N. V.

of an issue in journalists' reviews of continuous speech products, and there was a general loss of journalists' interest in the products.

Method

During the time that I worked on the ViaVoice desktop product, I collected all known journalists' reviews of our and competitors' products. To collect journalists' estimates of product accuracy for this paper, I went through the reviews published from 1997 to 1999 to find all the reviews in which the journalist stated a specific dictation accuracy or range of dictation accuracies for a product. If the journalist provided a range, I took the center of the range as the reported accuracy value. If the journalist provided separate estimates for initial accuracy and accuracy after enrollment or some use, I put both estimates in the database (see the Appendix for the accuracy database).

In all, I found 20 reviews in which the journalist provided an accuracy estimate for one or more continuous speech dictation products. The quality of any specific accuracy estimate might be questionable, but averaging over all of the available data could produce an interesting and reasonable picture of the relative position of the competitive products from the middle of 1997 to the end of 1999. Note that Dragon, IBM, and L&H released the first two versions of their products in 1997 with the second rapidly following the first. For this reason, the tables and graphs in the Results section include the first two products for each of these companies in 1997. Philips did not enter the market with a low-priced desktop product until the release of FreeSpeech '98 in 1998.

The products contributing to the data of this report were:

IBM	ViaVoice (1997) ViaVoice Gold (1997) ViaVoice '98 (1998) ViaVoice Millennium ⁷ (1999)
Dragon	NaturallySpeaking (1997) NaturallySpeaking 2.0 (1997) NaturallySpeaking 3.0/3.5 (1998) NaturallySpeaking 4.0 (1999)
L&H	Voice Xpress (1997) Voice Xpress 2.0 (1997) Voice Xpress 3.0 (1998) Voice Xpress 4.0 (1999)
Philips	FreeSpeech '98 (1998) FreeSpeech 2000 (1999)

⁷ ViaVoice Millennium is a trademark or registered trademark of International Business Machines Corp.

Results

The Appendix contains the complete database of journalists' estimates of accuracy for the products and time periods covered in this report (see the Methods section). Table 1 and Figure 1 show the associated mean accuracies.

Table 1. Journalists' Estimates of Continuous Dictation Accuracy from 1997 to 1999

Product	1997	1998	1999
IBM VV	87.6	92.8	95.2
DNS	89.7	94.0	95.0
L&H VX	89.2	89.2	93.0
Philips FS		81.5	89.9

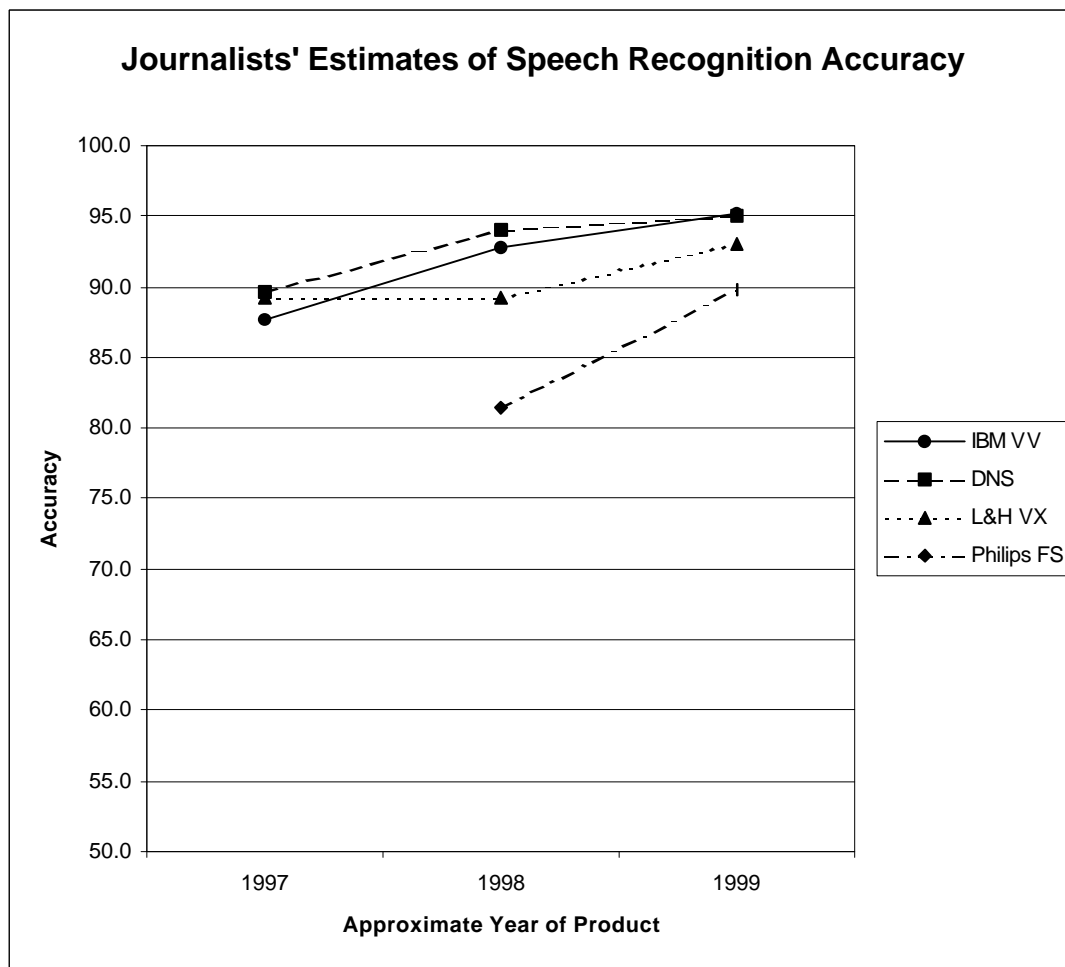


Figure 1. Journalists' Estimates of Continuous Dictation Accuracy from 1997 to 1999

Discussion

The data for 1997 showed Dragon as the accuracy leader, closely followed by L&H, with IBM lagging about 2% behind. L&H didn't introduce a new product in 1998, so it carried its 1997 accuracy into 1998. Philips entered the market in 1998, but with clearly lower accuracy than any other company. In 1998, the gap between IBM and Dragon narrowed to 1.2%. In 1999, Philips was still solidly in last place. L&H had improved, but had started to lag behind IBM and Dragon by about 2%. In 1999, IBM and Dragon had reported accuracies that were about equal, with 95.2 and 95.0% respectively.

In a dramatic series of events in early 2001, L&H acquired a number of companies (including Dragon Systems). L&H had previously acquired the Kurzweil speech products (at about the same time that IBM and Dragon released their initial low-cost continuous speech products). Shortly after the acquisition of Dragon Systems, L&H was unable to make several required payments. Millions of dollars supposedly kept in Korea were missing, assumed at the time of initial discovery to be due to embezzlement. Accounting audits then indicated that the highest levels of management at L&H were involved in serious accounting improprieties, which eventually landed them in jail. This series of events left L&H and Dragon Systems in shambles. For undisclosed reasons (possibly related to problems in achieving a competitive level of dictation accuracy), Philips stopped selling and supporting FreeSpeech in 2001 (except for a Finnish version). This has left IBM as the only remaining major player in the low-cost continuous speech dictation market. However, in their Office XP⁸ product (released in 2001), Microsoft added continuous speech to their word processor. Initial reports suggest that Microsoft accuracy is not as good as IBM ViaVoice accuracy, but only time will tell if this will reignite the accuracy wars.

⁸ Microsoft and Office XP are trademarks or registered trademarks of Microsoft Corp.

References

Due to the nature of this report, I've arranged the references in descending order of publication date rather than by author's last name. In many cases, the author is unknown.

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- November 5, 1999 – Benchmark test results. *PC Magazine* (<http://www.zdnet.com/pcmag/stories/reviews/0,6755,2388296,00.html>).
- November 1999 – Latest speech software gets you up and running faster. *PC World*, 63-64, Stan Miatskowski.
- October 19, 1999 – Dragon NaturallySpeaking Preferred 4.0. *PC Magazine*, Greg Alwang.
- October 19, 1999 – IBM ViaVoice Pro Millennium Edition. *PC Magazine*, Greg Alwang.
- October 1999 – Speak easy. *PC World*, 185-194, Christopher Lindquist.
- August 16, 1999 – Speech products: The talk of the town. *PC Week*, Herb Bethoney.
- January 1999 – Talk your way through apps with Voice Xpress Professional. *Computer Shopper*, Scott A. May.
- November 23, 1998 – Voice recognition software is making great strides, but still has a few problems. *Wall Street Journal*, Dale D. Buss.
- November 1998 – You talk, it types. *Consumer Reports*, 64.
- October 20, 1998 – Speech recognition: Finding its voice. *PC Magazine*.
- September 24, 1998 – IBM's ViaVoice lets you speak up and be heard. Don Crabbe (columnist).
- September 1998 – Handless typing for fast talkers. *WindowsPro*, 56-57, David D. Busch.
- September 1998 – Now hear this: IBM and Philips voice recognition apps. *PC World*, 74-75, Stan Miatskowski.
- May 8, 1998 – Voice Xpress Plus. *PC Magazine*, David Haskin.
- April 14, 1998 – The gift of gab. *CNET Reviews*, Gregg Keizer.
- March 10, 1998 – Watch what you say. *PC Magazine*.
- March 1, 1998 – A quantum leap in understanding continuous speech. *Wall Street & Technology*, 12, Andy Webb.
- December 30, 1997 – Sound off. *CNET Reviews*, Gregg Keizer.
- December 1, 1997 – NaturallySpeaking 1.0, ViaVoice 1.0. *Government Best Buys*, Brenda Cruden.
- October 2, 1997 – Now hear this. *CNET Reviews*, Sylvia Carr.

Appendix: Raw Data

IBM ViaVoice

	ViaVoice			
Date -- Publication	Original	Gold	98	Millennium
99-12-17 Houston Chronicle				
99-11-05 PC Magazine (OOB)				94.8
99-11-05 PC Magazine (after use)				98.0
99-11-01 PC World				90.0
99-10-19 PC Magazine (OOB)				95.6
99-10-19 PC Magazine (after use)				97.7
99-10-01 PC World (OOB)				
99-10-01 PC World (after use)				
99-08-16 PC Week				
99-01-01 Computer Shopper				
98-11-23 Wall Street Journal			91.2	
98-11-01 Consumer Reports			97.0	
98-10-20 PC Magazine			85.0	
98-09-24 Don Crabb (columnist)			96.0	
98-09-01 WindowsPro (OOB)				
98-09-01 WindowsPro (after use)				
98-09-01 PC World			95.0	
98-05-08 PC Magazine (OOB)				
98-05-08 PC Magazine (after use)				
98-04-14 CNET		78.0		
98-03-10 PC Magazine	87.8			
98-03-01 Wall Street & Tech.	85.0			
97-12-30 CNET Reviews		90.0		
97-12-01 Gov. Best Buys (OOB)	91.0			
97-12-01 Gov. Best Buys (after use)	94.0			
97-10-02 CNET				
Average	89.5	84.0	92.8	95.2
Combined 1997 Products	87.6			
Approximate year of product	1997	1997	1998	1999

Dragon NaturallySpeaking

	NaturallySpeaking			
Date -- Publication	Original	2.0	3.0/3.5	4.0
99-12-17 Houston Chronicle				95.0
99-11-05 PC Magazine (OOB)				95.3
99-11-05 PC Magazine (after use)				95.5
99-11-01 PC World				95.0
99-10-19 PC Magazine (OOB)				96.5
99-10-19 PC Magazine (after use)				98.0
99-10-01 PC World (OOB)				90.0
99-10-01 PC World (after use)				95.0
99-08-16 PC Week				
99-01-01 Computer Shopper				
98-11-23 Wall Street Journal		86.8		
98-11-01 Consumer Reports			97.0	
98-10-20 PC Magazine			91.0	
98-09-24 Don Crabb (columnist)				
98-09-01 WindowsPro (OOB)				
98-09-01 WindowsPro (after use)				
98-09-01 PC World				
98-05-08 PC Magazine (OOB)				
98-05-08 PC Magazine (after use)				
98-04-14 CNET	85.0			
98-03-10 PC Magazine		89.1		
98-03-01 Wall Street & Tech.				
97-12-30 CNET Reviews				
97-12-01 Gov. Best Buys (OOB)	93.0			
97-12-01 Gov. Best Buys (after use)	94.0			
97-10-02 CNET	90.0			
Average	90.7	88.0	94.0	95.0
Combined 1997 Products	89.7			
Approximate year of product	1997	1997	1998	1999

L&H Voice Xpress

	L&H VoiceXpress			
Date -- Publication	Original	2.0	3.0	4.0
99-12-17 Houston Chronicle				90.0
99-11-05 PC Magazine (OOB)				92.8
99-11-05 PC Magazine (after use)				94.3
99-11-01 PC World				
99-10-19 PC Magazine (OOB)				
99-10-19 PC Magazine (after use)				
99-10-01 PC World (OOB)				90.0
99-10-01 PC World (after use)				95.0
99-08-16 PC Week				96.0
99-01-01 Computer Shopper		85.0		
98-11-23 Wall Street Journal		83.8		
98-11-01 Consumer Reports	90.0			
98-10-20 PC Magazine	87.0			
98-09-24 Don Crabb (columnist)				
98-09-01 WindowsPro (OOB)	90.0			
98-09-01 WindowsPro (after use)	95.0			
98-09-01 PC World				
98-05-08 PC Magazine (OOB)	88.0			
98-05-08 PC Magazine (after use)	95.0			
98-04-14 CNET				
98-03-10 PC Magazine				
98-03-01 Wall Street & Tech.				
97-12-30 CNET Reviews				
97-12-01 Gov. Best Buys (OOB)				
97-12-01 Gov. Best Buys (after use)				
97-10-02 CNET				
Average	90.8	84.4		93.0
Combined 1997 Products	89.2			
Approximate year of product	1997	1997	1998	1999

Philips FreeSpeech

	Philips FreeSpeech	
Date -- Publication	Original ('98)	2000
99-12-17 Houston Chronicle		
99-11-05 PC Magazine (OOB)		91.3
99-11-05 PC Magazine (after use)		93.3
99-11-01 PC World		
99-10-19 PC Magazine (OOB)		
99-10-19 PC Magazine (after use)		
99-10-01 PC World (OOB)		85.0
99-10-01 PC World (after use)		
99-08-16 PC Week		
99-01-01 Computer Shopper		
98-11-23 Wall Street Journal		
98-11-01 Consumer Reports		
98-10-20 PC Magazine	80.0	
98-09-24 Don Crabb (columnist)		
98-09-01 WindowsPro (OOB)		
98-09-01 WindowsPro (after use)		
98-09-01 PC World	83.0	
98-05-08 PC Magazine (OOB)		
98-05-08 PC Magazine (after use)		
98-04-14 CNET		
98-03-10 PC Magazine		
98-03-01 Wall Street & Tech.		
97-12-30 CNET Reviews		
97-12-01 Gov. Best Buys (OOB)		
97-12-01 Gov. Best Buys (after use)		
97-10-02 CNET		
Average	81.5	89.9
Combined 1997 Products		
Approximate year of product	1998	1999