

MP3 vs CD Experiment

Independent Variables

- ▶ Music Programs (4)
- ▶ Encoding Quality (2) [CD-quality versus Lame 3.97 version 2.3 @ 128 mbps, CBR]
- ▶ Observations (3)

Dependent Variable(s)

- ▶ Preference Choice (A or B)
- ▶ Magnitude of Preference (slight, moderate, strong)
- ▶ Comments (explain the differences in sound quality)

Programs

Track	CD	Notes
AP	Live Concert Applause	
DL	Dawn Langstroth, A Case of You from LiveWire, Linn Records, 2009	female vocal with acoustic guitar
JW	Jennifer Warnes, The Hunter from The Hunter, Private Music, 1992	female vocal with strings
SM	Suzannah McCorkle, Someone to Watch Over Me, From Someone to Watch Over Me, Concord Records, 1996	Jazz orchestra with female vocal

Method for Presenting Stimuli

Double-blind presentations

Paired (A/B) comparisons

12 trials (4 programs w. 3 observations)

Order of programs and stimulus presentation randomized

9 listeners in two seating rows

Average playback level @ 78 dB (B-weighted)

Test duration ~ 30 minutes



Harman Reference Room

Standardized room for listener training, research and product evaluation

Quiet, adjustable room acoustics

High quality calibrated playback system

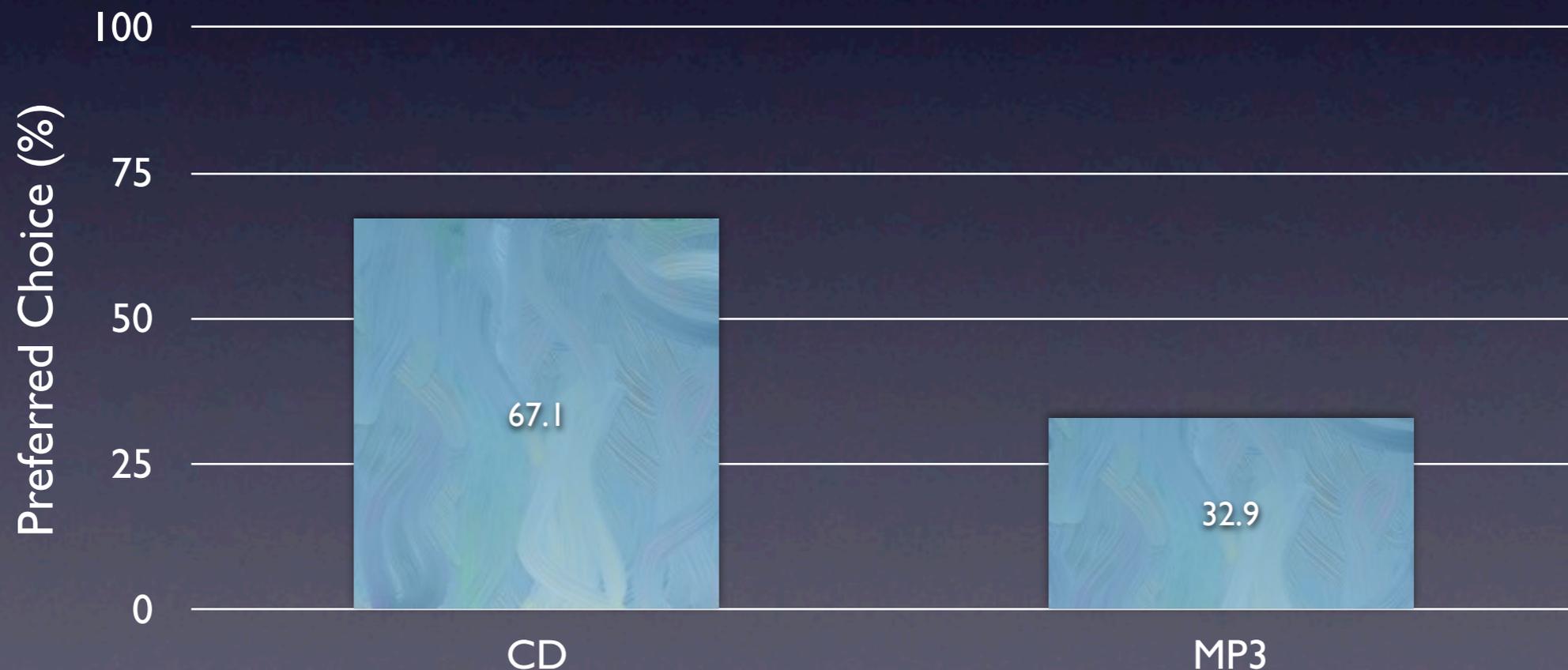
Automated speaker mover integrated into wall



Results

CD Preferred Over MP3

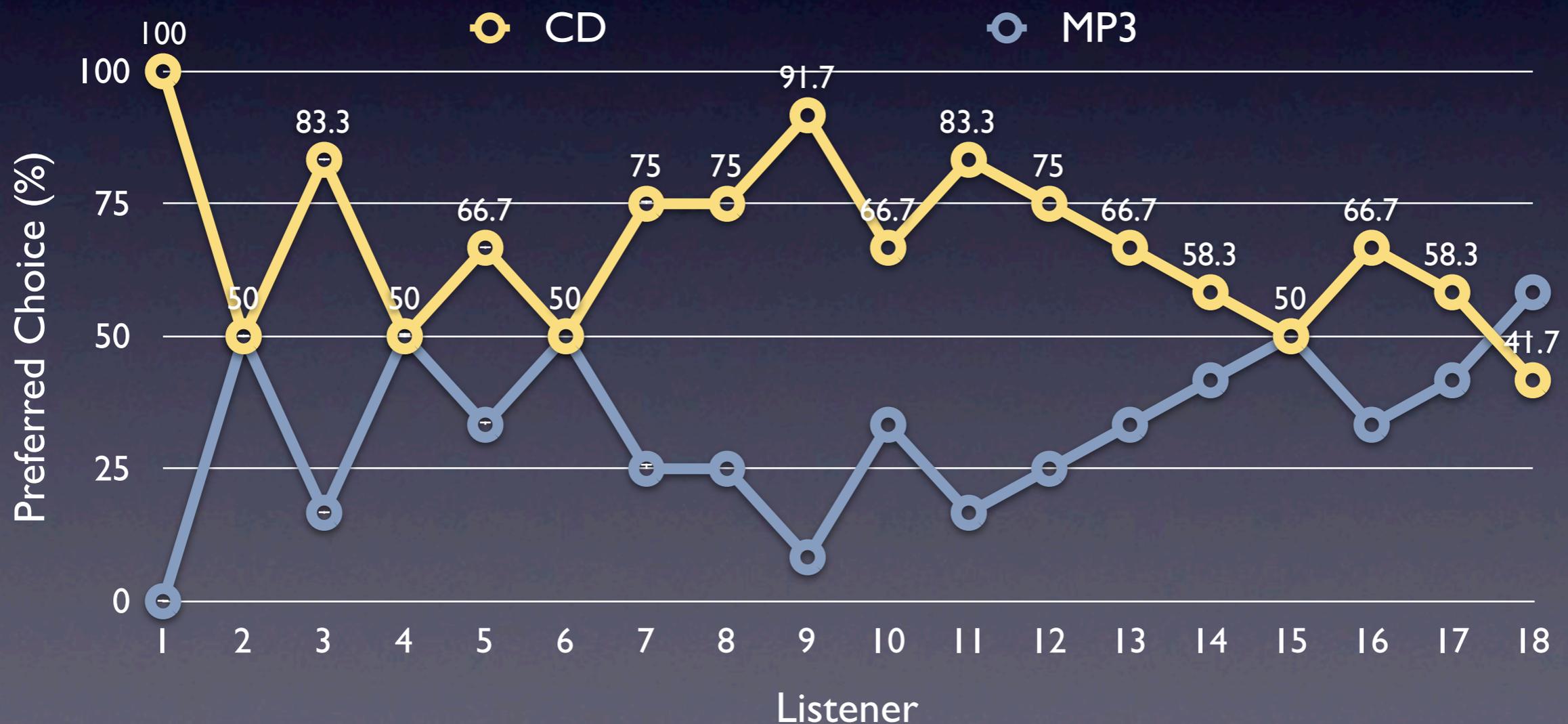
- ▶ **Summary:** Music reproduced at CD-quality was preferred more than twice as many times (67 % versus 33%) as the MP3 version



Individual Listener Preference

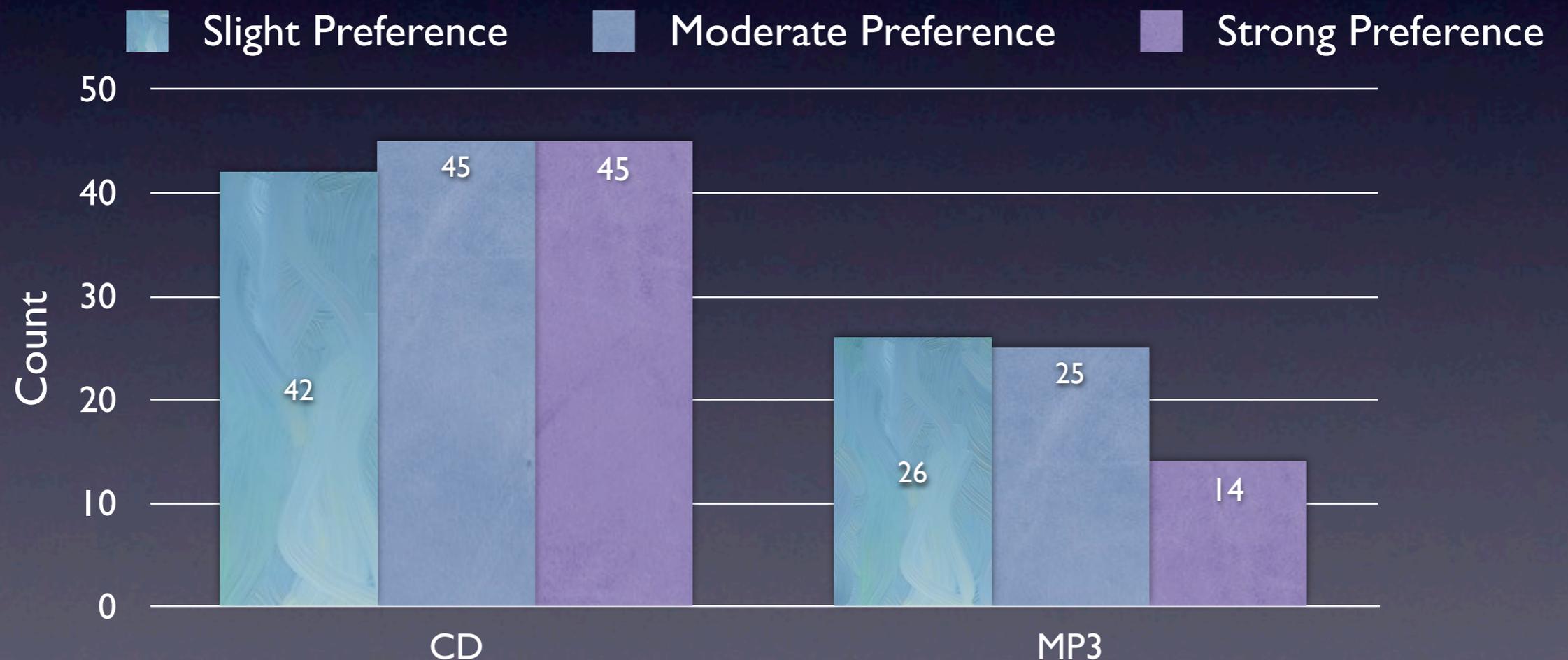
- ▶ **Summary:** Significant differences among individuals in their ability to formulate consistent preference choices

note: preference is significant ($p \leq 0.054$) when a format is chosen 9 or more times (75%) out of 12 trials



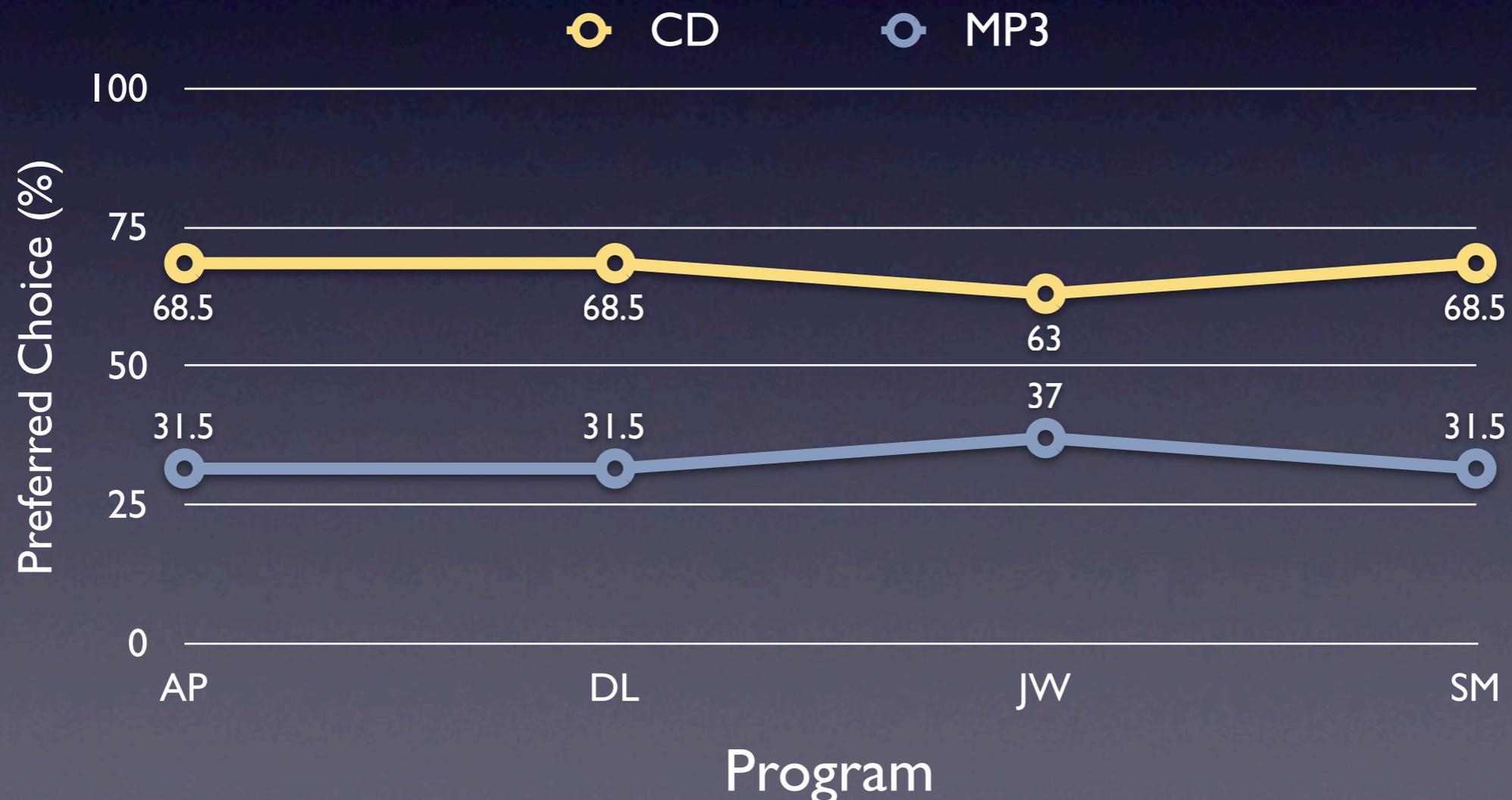
Strength of Preference

- ▶ **Summary:** When CD was preferred the magnitude of preference tended to be stronger than when MP3 was the preferred choice



Program Effect

- ▶ **Summary:** Preference for CD over MP3 formats was constant for all programs except JW where the audible differences were probably less apparent



Listener Comments

LISTENER ID (% CD CHOICES)	CD	MP3
1 (100%)	Reverb is stronger; brighter; more raw and real; natural and raw	Sound is more closed; audible noise; clogged, strained, screaming to be heard; cleaner but sounds restrained; sounds like refined mercury: it's silvery and metallic
9 (92%)	Warmer, less fuzzy, cleaner, more percussive impact	
3 (83%)	Much crisper high end; better sound in low en; vocals cut through better	Duller,
12 (75%)	sounds fuller; seems brighter and fuller	
8 (75%)	more dynamic and resonant; adds more noise and crackle (applause); clear of distortion and balances guitar and voice better	There is a sheen on the high end and it seems more compressed and less dynamic; cuts out a lot of the high end; some distortion which is very noticeable sometimes; swirling sound, inaccuracy' cuts off much of the dynamic rage, particularly in the drum fill; adds noise around sibilance
10 (67%)	I feel the dynamics and fuller sound; the highs and lows of the instruments are astounding in comparison	The voice seems slightly distorted
17 (58%)	More clear, smoother; no modulation on her voice; I like it because it has more of a vinyl sounds; it has more dynamics and it not being so flattened - sounds more real	I prefer it only for the fact that the crackling gives a little bit of a vinyl feeling, which I listen to the most; sounds very flat; has a weird wavering in her voice that is not normal; note transitions choppy

Loudspeaker Preference Test

Loudspeakers

\$500.



Infinity
Primus 362

\$800.



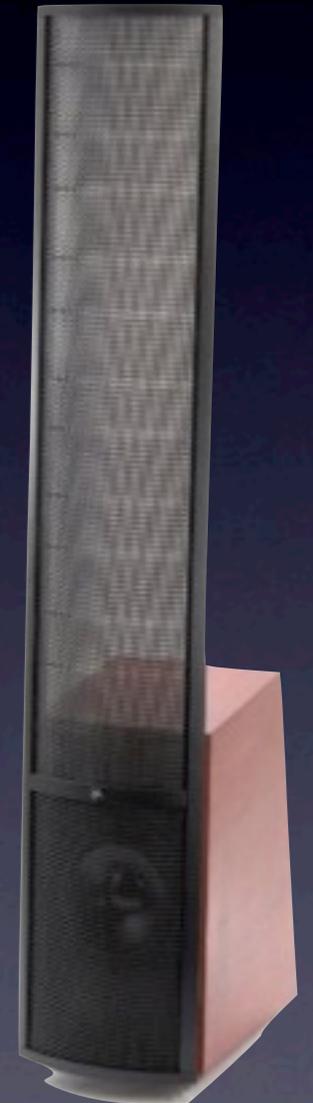
Polk Rti 10

\$600.



Klipsch
RF35

\$3,800.



Martin Logan
Vista

Test Method

Multiple (A/B/C/D) double-blind comparisons; loudspeakers level-matched

Speaker position held constant using automated speaker shuffler in MLL

4 trials (2 programs x 2 observations)

Program order and speaker presentations randomized

Average playback level @ 78 dB (B-weighted)

