Sound Escape Empirical Data & Trials Summary

Route description	Type of trial	Application	Researcher, Location, Date	Sample size	Without Sound Escape	Comments	With Sound Escape	Comments	Improved Egress	Reference
Basic large open space	*TV studio - smoke filled*	Building	Prof. D.Withington Leeds University, UK, 1999	50	**230 seconds**	Tentative movement - no confidence in direction	**15 seconds**	Rapid movement - confident of direction	**Up to 15 times faster (94%)**	1
Cabins & Corridors	*Caledonian MacBrayne Ferries*	Hotels, Office Buildings, Marine.	University of Strathclyde, Marine Coastal Authority, Scotland, 2001	10 trials of 20 people	**286s (Ave for 18th person)**	1 exit available (2 blocked or not available)	**109s (Ave for 18th Person)**	The problem arises when the volunteers who have planned a different exit, encounter a locked door. Clear benefit in the use of sound as an aid to guidance.	**62% reduction in exit time**	1
Open spaces & stairs	*Caledonian MacBrayne Ferries*	Hotels, Office Buildings, Marine.	University of Strathclyde, Marine Coastal Authority, Scotland, 2001	6 trials of 20 people	**30% chose nearest exit**		**100% chose nearest exit**	Improved utilisation of available closest exit	**Closest exit chosen every time**	1
Unusual route & stairs	*Caledonian MacBrayne Ferries*	Hotels, Office Buildings, Marine.	University of Strathclyde, Marine Coastal Authority, Scotland, 2001	4 trials of 14 people	**140s for all to exit**	4 people had to be escorted out of trial	**90s for all to exit**	All participants located the exit	**35% reduction in ext time**	1
Left or right	*School building*	Building	Prof. D.Withington Leeds University, UK, 2000	162		*SEE "LEFT OR RIGHT" WORKSHEET ATTACHED*		*SEE "LEFT OR RIGHT" WORKSHEET ATTACHED*		2
Multiple choice in open space	*School building*	Building	Prof. D.Withington Leeds University, UK, 2000		**14.5 seconds**	3 Doors available in Open Space but only 1 Exit - SMOKE	**4.9 seconds**	Target exit more easily identifiable	**66% reduction in exit time**	2
Complex maze	*School building*	Building	Prof. D.Withington Leeds University, UK, 2000		**97.8 seconds**	Participants went through a series of rooms to a safe exit - SMOKE	**51.3 Seconds**	Significant improvement - office building scenario	**48% reduction in exit time**	2
Twin aisle plane	*Aircraft cabin*	Aircraft, Auditoriums, Cinemas	University of Greenwich & University of Cranfield, UK, 2000	108	**49% used 1 exit**	Non even door usage	**20 - 30% for each door**	Even door usage	**Better use of available exits.**	3

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Road vehicle tunnel	*Exit from tunnel filled with smoke*	Road Tunnels	Prof. Withington - Leeds University, L. Boer - TNO Human Factors, Netherlands, 2002	33	**N/A**	Participants could not locate the exits. Exits were not visible.	**N/A**	70% found exits if briefed on the sound. This trial highlighted the need for "EXIT Here" annunciation between the directional temporal sound	**Exits only found with help of sound**	4
Atrium test	*Carnival Conquest Cruise Liner*	Hotels, Office Buildings, Marine.	Fincantieri, University of Leeds, Carnival, Italy, 2002	32	**N/A**	Most commented that they could not see an exit from their starting position, and none could see an illuminated exit sign	**N/A**	Several commented after moving even a short distance they were immediately able to tell the difference between sounders and locate their nearest exit by following the loudest sound. Having located that exit they were able to move on and locate other exits nearby with surprising ease	**N/A**	1
Cabin evacuation test	*Carnival Conquest Cruise Liner*	Hotels, Office Buildings, Marine.	Fincantieri, University of Leeds, Carnival, Italy 2002	32	**135.7s for all to exit**	Participants had Low Level Lighting (LLL) but no sound	**60.5s for all to exit**	Speed of movement was much greater, with everyone walking upright – at a slow walking pace	**55% (75 secs) faster than LLL**	1

Reference Material - full document package available from Clevertronics

1. DSE Website, University of Strathclyde
2. Left or right Test Data, Life Saving Applications of Directional Sound Paper
3. The Use of Directional Sound to Aid Aircraft Evacuation, Professor D.Withington
4. Auditory Guidance in a Smoke Filled Tunnel, L.C. Boer & D.J. Withington, Ergonomics August 15 2004

Left or Right Trials Summary

Route description	Type of trial	Application	Researcher, Location, Date, Trial No.	Sample size	Without Sound Escape	Comments	With Sound Escape	Comments	Improved Egress	Reference
Left or right, SMOKE PRESENT	*18m corrior, Exit at each end. Entry in middle, Smoke present*	Secondary school building	D.Withington, Leeds University , 2000 1.1.2 & 1.2.2	40	**0.43 m/s travel speed**		**0.53 m/s travel speed**	An in crease of 23% in walking speed using DSE	**23% increase in walking speed**	2
			1.1.2 & 1.2.2	40	**3.56s decision time**		**2.67s decision time**	A 25% reduction in decision time	**25% reduction in decision time**	2
			1.1.2 & 1.2.2	40	**23.04s travel time**	(Travel time after decision)	**15.98 travel time**	A 30% reduction in travel time	**30% reduction in travel time**	2
Target Exit Test (only 1 out of 2 exits available) SMOKE PRESENT	*18m corrior, Exit at each end. Entry in middle, Smoke Present*	Secondary school building	D.Withington, Leeds University, 2000 1.1.2 & 1.2.2	40	**52% made target exit**	48% missed target exit	**85% reached target exit**	No briefing on sound	**Increased utilisation of Exits**	2
			1.1.2 & 1.4.2	40	**52% made target exit**	48% missed target exit	**90% reached target exit**	Participants were briefed on the sound. Only 1 person from the 20 did not reach the target exit with directional sound.	**Increased utilisation of Exits**	2
Left or right, NO SMOKE PRESENT	*18m corrior, Exit at each end. Entry in middle, No smoke present*	Secondary school building	D.Withington, Leeds University , 2000 1.1.1 & 1.2.1	40	**1.36m/s tavel speed**		**1.45m/s travel speed**	An in crease of 7% in walking speed using DSE	**7% increase in walking speed**	2
			1.1.1 & 1.2.1	40	**2.38s decision time**		**1.84s decision time**	A 22% reduction in decision time	**22% reduction in decision time**	2
			1.1.1 & 1.2.1	40	**5.62s travel time**	(Travel time after decision)	**4.71s travel time**	A 16% reduction in travel time	**16% reduction in travel time**	2
Target Exit Test (only 1 out of 2 exits available) NO SMOKE PRESENT	*18m corrior, Exit at each end. Entry in middle, No smoke present*	Secondary school building	D.Withington, Leeds University, 2000 1.1.1 & 1.2.1	40	**65% made target exit**	35% missed target exit	**90% reached target exit**	No briefing on sound	**Increased utilisation of Exits**	2
			1.1.2 & 1.4.2	40	**65% made target exit**	35% missed target exit	**100% reached target exit**	Participants were briefed on the sound.	**Increased utilisation of Exits**	2

Reference Material - full document package available from Clevertronics

2. Left or right Test Data, Life Saving Applications of Directional Sound Paper

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