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Scream 2's Screams to Screen Scream 6

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Abstract
Randy, a character, from *Scream 2* acknowledges that the sequel of a horror film has more of everything than in the original. Considering this increased amplification *Scream 2* was considered as a possible fuel to screen *Scream 6*, except based solely on the screams in *Scream 2* and the length of those screams. From calculating intensity and power of the total screams in the film, which were 58, the power turned out to be 8,264,529,160 W and this power is enough to screen *Scream 6* and the other films in the franchise at least once; 1,366,313 screenings of *Scream 6* can be powered with all the screams in *Scream 2*.

Keywords: *Film; Physics; Power; Sound; Energy; Scream; Scream 2; Scream 6*

Introduction

Figure 1 – A snippet from the opening scene of scream where a group of people are watching the film 'Stab'. This scene contains the first 12 screams which are mostly group screams [1].

Scream is a franchise of horror; thriller films that pokes fun at the typically horror film tropes. Almost a caricature. Not to be confused with the *Scary Movie* franchise which is a parody of the caricature. While a bit confusing it is important to make this distinction. In this paper the fear-invoking movie of concern is *Scream 2* [2]. During this film there are a lot of screams, as to be expected considering the title. But what is *Scream 2* about? Following on from a successful film *Scream* [3], *Scream 2* begins in a movie theatre where people are watching a film called *Stab*. This film *Stab* is essentially a parody version of the initial film *Scream*, and people are wearing costumes and have fake glow in the dark knives and the entire environment is rowdy. A couple on a date enter the movie cinema and eventually the horror begins after one of them heads to the bathroom, stabbings, gore, and lots of blood. This scene is a precursor to the actual plot of the film which builds upon the stories of the initial Scream characters. They are now in 'University' and trying to move on from the atrocities that took place when they were in 'High School'. And much like the title they scream a lot as a scary murderer with a knife goes after them [2]. The film was set in 1998 but filmed in 1997 [4].

Human Scream Background

Large bursts of noise are typically found in mammalian species; particularly in primates like humans. Our large bursts occur not only for screaming but also joyous occasions like laughter [5]. The purpose of a scream is to cause a reaction in those that can hear; to alert them of a negative circumstance [5]. They signal the presence of threats such as environmental disasters; or in this case the occurrence of a physical threat like Ghostface in the context of *Scream 2* [5].

Screams in *Scream 2*

The metric for the association of a scream involved instances where characters released a high pitch, hoarse or shrill in characteristic wail or sound. A loud sound that is uncomfortable to the ears. The Cambridge dictionary defines a scream as:

> *"… to cry or say something loudly and usually on a high note, especially because of strong emotions such as fear, excitement, or anger" [6]*

Using this information, a method was produced in order to determine the number and duration of screams in the film.

Data Collection Method

Another science student and I watched the film *Scream 2*. When a scream began the film was paused, the time noted and then the ending of time of the scream was noted also (se Appendix A). An issue in the method was that even though there were two people watching the film discerning when an actor with a deeper voice was screaming or shouting was difficult. The data has been recorded and the time duration calculated via subtraction. Characteristics of the scream were also noted for example if it was an individual screaming, a pair screaming, a group screaming or if there were different screams overlapping. A transduction device to collect the scream energy from *Scream 2* would be required if this were to be a feasible way to power the film screenings. This study considered all screams as a single scream when there were around more than 21 group screams.

Calculating power of the screams in *Scream 2*

$$b = 10 \log_{10}\left(\frac{I}{I_0}\right) \qquad (1)$$

In this equation b is the decibel level, I is the intensity of the sound and I_0 is the threshold intensity for hearing and the value is 10^{-12} Wm^{-2} [7].

First, we will consider the decibel sound range for a scream. The value for decibel of the sound will be calculated by taking the average values for the upper and lower bound decibels of a scream: 80 and 125 dB [8]. So, we will approximate all the screams to be at 102.5 dB. Using this the intensity of a single scream, Wm^{-2}, can be calculated to be:

$$\frac{102.5}{10} = \log_{10}\left(\frac{I}{I_0}\right)$$
$$10^{\frac{102.5}{10}} = \frac{I}{I_0}$$
$$10^{-12} \times 10^{\frac{102.5}{10}} = I$$
$$I = 0.0177827941\ Wm^{-2}$$

We can then calculate the distance travelled by the scream using the speed of sound and the total duration of all the screams which amounts to: 581 seconds. Speed of sound through air 331 ms^{-1} [9]. The length of all the total screams is 192,311 m and we consider the sound to be travelling from an isotropic point. So, we can use the equation [10]:

$$I = \frac{P}{4\pi r^2}, \qquad (2)$$

where P is power in watts (W) and r is the radius (m). Inputting the length as r and previously calculated intensity, I, we can rearrange the equation to find the power:

$$0.0177827941 \times 4 \times \pi \times 192311^2 = 8264529160\ W \qquad (3)$$

The average local movie cinema is considered to require 12.4 kWh of energy to screen a film [11] and *Scream 6* has the longest run time of the scream films of 2 hours and 3 minutes [12, 13]:

$$Power\ to\ screen\ a\ single\ viewing\ of\ Scream\ 6 = \frac{Energy}{time} = \frac{12.4 \times 10^3}{\frac{123}{60}} = 6048.780488\ W \qquad (4)$$

$$No.\ of\ screenings\ screened\ by\ the\ screams = \frac{8264529160}{6048.780488} = 1366313$$

Conclusion

As the power required to screen *Scream 6* is 6,049 W and the power produced by the screams in *Scream 2* is 8,264,529,160 W this shows that the screams in *Scream 2* would be able to power at least 1 viewing of *Scream 6*. The most screenings of *Scream 6* that can be screened is 1,366,313 screenings, using the screams from *Scream 2*. This goes on to suggest that all the scream films can be screened at least once using the screams from *Scream 2* because they also have a shorter run time. This study considered all screams as a single scream meaning that the actual number of screenings is most likely larger. A future *Scream 2* scream investigation can be more precise as it could consider the amount of people involved in the scream and the likely decibel of the scream. Further consideration of the capabilities of the transduction device used to collect the scream energy from *Scream 2* would also be beneficial in the future.

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Appendix A: Scream 2's screams

Scream	Start time	End time	Time taken (s)	Description of scream
1	00:01:38	00:02:51	73	group (movie theatre)
2	00:02:58	00:03:41	83	group (movie theatre)
3	00:04:08	00:04:15	7	group (movie theatre)
4	00:04:42	00:04:44	2	group (movie theatre)
5	00:04:50	00:04:54	4	group (movie theatre)
6	00:05:37	00:05:41	4	group (movie theatre)
7	00:06:27	00:06:56	29	group (movie theatre)
8	00:06:57	00:06:58	1	single
9	00:08:46	00:08:50	4	group (movie theatre)
10	00:08:59	00:09:00	1	single
11	00:09:12	00:09:13	1	single
12	00:09:24	00:11:21	117	group (movie theatre)
13	00:34:22	00:34:24	2	killer + victim
14	00:34:35	00:34:36	1	single
15	00:34:39	00:34:42	3	single
16	00:34:45	00:34:46	1	single
17	00:34:49	00:34:53	4	single
18	00:34:57	00:35:08	11	single
19	00:49:38	00:49:51	13	group (college)
20	00:50:36	00:50:37	1	single
21	00:58:53	00:58:55	2	single
22	01:04:56	01:05:22	26	single
23	01:05:56	01:05:59	3	single
24	01:19:09	01:19:11	2	overlapping pair
25	01:19:11	01:19:18	7	single
26	01:22:30	01:22:31	1	single
27	01:22:36	01:22:37	1	single
28	01:22:42	01:22:43	1	single
29	01:24:47	01:25:06	19	group of 9
30	01:25:07	01:25:30	23	room of people
31	01:26:01	01:26:35	34	4 people in the car
32	01:26:36	01:27:01	25	3 people left alive
33	01:27:07	01:27:13	6	3 people left alive
34	01:31:44	01:31:50	6	2 people left alive
35	01:32:11	01:32:12	1	Gale
36	01:32:36	01:32:37	1	Gale
37	01:32:43	01:32:44	1	Gale
38	01:32:50	01:32:51	1	Gale
39	01:34:55	01:34:56	1	Gale
40	01:36:53	01:37:00	7	Gale
41	01:37:00	01:37:02	2	2 people
42	01:39:25	01:39:26	1	single
43	01:44:33	01:44:34	1	single
44	01:44:40	01:44:42	2	single

45	01:44:43	01:44:44	1	single
46	01:44:44	01:44:54	10	single
47	01:45:03	01:45:05	2	single
48	01:45:08	01:45:14	6	single
49	01:45:43	01:45:44	1	single
50	01:45:54	01:45:56	2	single
51	01:46:03	01:46:07	4	2 people
52	01:46:07	01:46:10	3	solo
53	01:46:13	01:46:17	4	2 people
54	01:48:26	01:48:27	1	2 people
55	01:49:26	01:49:27	1	2 people
56	01:49:36	01:49:39	3	Gale
57	01:50:13	01:50:19	6	4 screamers
58	01:50:25	01:50:26	1	1 scream
		Total	581	