Blink-free Photos, Guaranteed

Well, almost. CSIRO physicist Dr Piers Barnes explains to writer and occasional photographer Nic Svenson how many shots she should take to get one where no one's blinking.

Anyone who's played photographer at family functions knows that there's always someone who blinks, even if everyone stays perfectly still. I often have to take group photos, and I wondered just how many shots I'd have to take to get one where no one's blinking. I started counting: people, photos, photos spoilt due to blinks... It was taking forever! I couldn't make up a rule after 10 counts. To be what's known as statistically significant, I'd need around 200.

I whinged to my colleague, Dr Piers Barnes, and he said: "You don't need data, we can model it". Trying not to feel like an idiot for thinking that science is based on hard numbers, I set about finding some figures to plug into the formula Piers was working on.

It turns out that the average number of blinks made by someone getting their photo taken is 10 per minute. The average blink lasts about 250 ms but a camera shutter stays open for about 8 ms in good indoor light.

Figuring out the number of photos to take so I can expect to get one where no one's blinking relies on probabilities (I'd like to guarantee a good shot, but apparently this is impossible as there's always a chance someone will blink). When sorting out probabilities, you have to consider what might influence them.

For our purposes, it's fair to say that blinks are independent. If a group of people is looking at a camera, one person's blinks won't influence another's and, unless you've got something in your eye, your blinks don't influence each other either. It's also safe to say that blinks are random; they don't happen every 6 seconds.

Prop her eyelids open with matchsticks! Nic Svenson spoils a nice photo of Piers Barnes.

This means we're looking for the probability of a random event (a blink) occurring during a window of time (how long the shutter's open) that's much shorter than the event itself.

Piers says that the probability of one person spoiling a photo by blinking equals their expected number of blinks (x) multiplied by the time during which the photo could be spoilt (t) – if the expected time between blinks is longer than the time in which a photo can be spoilt, which it is.

This makes the probability of one person not blinking $1 – xt$. For two people it's $(1 – xt)^2$, and for a group of people it's $(1 – xt)^n$, with n being the number of people.

This means that $(1 – xt)^n$ is also the probability of a good photo. Therefore, the number of photos needed should be $1/(1 – xt)^n$.

Let's test this: each shutter opening results in either a good photo or a spoilt one. If you make a graph of a lot of these successes you'll find it follows what statisticians call a normal distribution. Even if you know nothing about stats, you've probably heard of the bell curve – that's what the normal distribution looks like.

At one end of the curve the trials are 100% successful: the photographer got all good shots. In the middle, the number of good and bad photos is split 50:50. At the other end are all dud trials: the photographer got no good shots.

Piers then figured out how many shots I'd need to be 99% certain of getting a good one. He found that photographing 30 people in bad light would need about 30 shots. Once there's around 50 people, even in good light, you can kiss your hopes of an unspoilt photo goodbye.

Piers also came up with a rule of thumb for calculating the number of photos to take for groups of less than 20: divide the number of people by three if there's good light and two if the light's bad.

Bits & Pieces

What makes people blink more than normal?

- nervousness;
- bright light;
- dry air;
- being on TV;
- stress;
- fatigue;
- wind;
- not telling the truth (remember, this is more blinks than normal. Just because someone blinks a lot doesn't necessarily mean they're lying);
- contact lenses;
- pre-flash flashes (red-eye reduction);
- fancying the photographer; and
- the photographer talking about how often people blink in photos.

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