SAMSUNG

A PSYCHOLOGICAL FORMULA FOR EXPLAINING THE 'MISSING SOCKS PHENOMENON'

THIS RESEARCH WAS CONDUCTED OVER TWO PHASES DURING FEBRUARY-APRIL 2016:

Phase 1:

Discovering the factors that contribute to sock loss

One on one, psychological interviews were conducted with 24 participants who undertook the washing 'duties' within their households. This uncovered the processes, environments, key stakeholders and outcomes within the home washing regime.

Phase 2:

Quantifying and building a statistical model that predicts sock loss

Quantitative assessment of the factors that emerged from Phase 1 that contributed to sock loss. 2000 participants roughly divided equally into each of the major regions of England as well as representative participants from Wales, Scotland and Northern Ireland undertook an online survey that statistically assessed the contributory factors of sock losses in their households.

HEADLINE RESULTS

1. Missing socks are largely caused by cognitive biases in decision making and attention.

2. The main statistically significant contributing factor to socks going missing was 'Laundry Complexity" (which is the number of separate black/white washes households undertake in a week) + the average number of socks in each wash cycle.

3. Missing sock phenomenon is predicted by the following formula:

The higher the resultant number the greater the probability that socks will go missing. Negative numbers indicate the unlikelihood that socks will go missing in that household.

WHERE:

L = Laundry size

(Calculated by multiplying the number of people in the household (p) with the frequency of washes in a week (f))

C = Washing complexity

(Calculated by adding how many types of wash (t) households do in a week (darks + whites) and multiplying that by the number of socks washed in a week (s))

PA = Degree of practical attention

(Which is the sum how many of these things you do at the start of each wash check pockets, unroll sleeves, turn clothes the right way, unroll socks)

A = The positive attitude to doing laundry

(Measured by a score of 1- 5 with 1 being 'Strongly dislike doing clothes washing' to 5 'Strongly enjoy doing clothes washing')

4. 64% of the sample admitted up to 2 socks goes missing each month. People in the South West lose more socks on average a month than any other region and people in the North West the least.

5. Coloured socks are more than three times likely to go missing than any other type (white, stripy, spotty etc.).

6. North East of UK has the greatest degree of 'Laundry Complexity' (which is the number of separations (lights/colours/sheets/high/low temp etc.) + number of pairs of socks put in each wash + how many people do the wash.

7. The North East also has the most positive attitude to 'laundry washing', while the South East has the least positive attitude.

8. South East has the greatest scores for 'Practical Attention' of their pre-wash laundry (emptying pockets, unrolling socks/sleeves, turning clothes the right way around etc.) than any other region.

9. The North East has the greatest 'wash size' (comprised of the number of people in the household x the frequency of doing a wash) than any other region.

PHASE 1 QUALITATIVE INTERVIEW RESULTS:

BREAKDOWN OF PARTICIPANT DEMOGRAPHICS:

Region	Gender	Age	Number of people in household you are responsible for in terms of washing	Washes per week
NE	Male	31	1	1
NE	Female	46	5	3
NE	Male	52	4	2
NE	Female	36	3	2
NE	Female	64	2	2
NE	Female	23	1	1
NW	Female	20	2	2
NW	Female	55	4	3
NW	Male	40	3	3
NW	Female	33	3	2
NW	Male	54	5	4
NW	Female	47	4	3
SE	Male	27	2	2
SE	Female	30	2	1
SE	Male	58	3	2
SE	Female	44	4	3
SE	Female	56	3	3
SE	Female	70	2	2
SW	Male	36	3	3
SW	Female	41	4	3
SW	Female	24	1	1
SW	Male	32	1	2
SW	Female	53	3	2
SW	Female	66	2	2

From the interviews with these 24 people four themes emerged that seemed to predict sock losses in households throughout the UK these were:

Diffusion of responsibility, visual awareness, cognitive decision making and behavioural errors.

PSYCHOLOGICAL EXPLANATIONS FOR THE EXISTENCE OF 'MISSING SOCK PHENOMENON'

Diffusion of responsibility – "someone else has it covered effect"

WHAT IS IT?

Simply put, when a task is placed amongst a group of people, there's a strong tendency for each individual to assume someone else will take responsibility for it—so no one does. In a classic experiment by Darley and Latané (1968), participants saw someone having a (fake) seizure. When participants believed they were the only witness to the incident, 81% went to get help; when participants thought there were four other witnesses, only 31% went for help.

This was one main theme that emerged from many of the households that were interviewed. It was especially evident where multiple people were involved in the clothes washing process. Ownership became blurred in households where there we more than two people engaged in the clothes washing process.

Many reasons for our falling prey to this assumption exist. We're all busy with our own lives and don't want to get involved. We may not believe we're the best person to assume responsibility, that someone else is better skilled to do a better job. We may not care about the issue involved. We may be lazy. After all, no four words in the English language are ever easier to say than: it's not my problem.

INDICATIVE QUOTES:

"It's a bit of a free for all I would say. My husband and my daughter can also do washes (to a varying degree of efficiency!) So I guess we all assume that everyone is on the case with anything that might go missing – in reality we just all blame one another if anything goes pink or AWOL!"
Female, 56, Nurse, SE.

"Dad is definitely the washing pro in our house – so we just default to his expertise! Of course I moan at him if one of my socks goes walkies!"
Female, 33, Dental Nurse, NE.

"As several of us use the washing machine in our home I think there is a general assumption that 'someone' is a) responsible for putting everything that needs to be together into the machine and b) gathering and pairing it all up again. In truth I suspect we all think that 'someone' is the other person!"
Male, 40, Sales, NW.

"I just assume my mum has a complete handle on what's going on in the washing department. I don't know why – as they are my clothes too!"
Female, 20, Student, NW.

"I remember that a funny stale smell was emanating from the spare room. When I investigated I found a washing basket full of clothes that had been washed, dumped in the basket but not placed out to dry properly. Somewhere someone had simply assumed that they had got the washing out and another member of the household would put it out to dry."
Male, 54, Technician, NW.

"Clothes washing is chaotic in our house. Everyone has a go of stuffing clothes in but not everyone is then up for the job of ***pairing it all together when it comes out!"***
Female, 44, Media, SE.

VISUAL AWARENESS

THE HEURISTICS OF AVAILABILITY AND CONFIRMATION

WHAT ARE HEURISTICS?

Heuristics are mental problem solving shortcuts that we deploy to save time and effort. Think of when you lose the TV remote. What you tend to do is search in all the likely places (under the cushions, down the side of the sofa, underneath it etc.). These behaviours are activated by our calculation of 'likelihood' based on ease of execution. The best way to find the remote of course is to systematically search the house room by room until you find it.

The availability heuristic and the 'missing sock phenomenon'. This 'time and effort saving' heuristic is significantly influential in sock loss.

One particular heuristic is call the 'availability heuristic'. Availability is a cognitive heuristic in which a decision maker relies upon knowledge that is readily available rather than examine other alternatives or procedures. It operates under the principle that "if you can think of it, it must be important."

For example, we tend to think more about tidying our gardens in the spring not because it's getting warmer but because we see more flowers due to blossoms – so we make the assumption that blossoms are flowers and it reminds us that if we want flowers we need to start doing things in the garden! This judgmental heuristic is called availability. Availability is a useful clue for assessing frequency or probability, because instances of large classes are usually reached better and faster than instances of less frequent classes. However, availability is affected by factors other than frequency and probability. Consequently, the over-reliance on availability leads to problems and failure in solving many problems.

This cognitive bias is at work in the washing journey as well. If we cannot see that socks have become separated from its pairing then we do not consciously think about it or become alerted to it. In other words if we see an odd sock at the top of the dirty washing pile we instinctively search for its match. However, if we are organising the next wash by colour we tend to look for 'whites' or 'colours' rather than 'items' of clothing. Thus our visual priority (just trying to find all whites or seeing an odd sock at the top of the pile) dictates our subsequent problem solving behaviour. This cognitive bias was evident among most of the participants that were interviewed.

INDICATIVE QUOTES:

"If I am doing a dark wash – as long as there are not any dark items left in the wash basket that I can see then the wash goes on. At that stage I probably don't invest too much effort in making sure I have all the matching items together (such as socks, pyjama sets etc.). I kind of assume."
Female, 41, Financial Services, SW.

"I guess it's easier to spot some socks aren't together in the washing basket than others. So striped or coloured socks are immediately visible if you don't see two the same together when you collect the wash. White and black socks are the problem as you tend to assume that there is at least one pair in amongst the bundle!"
Female, 53, Receptionist, SW.

"I guess thinking on it, it's not very rational of me but I just assume that socks 'stick' together really – unless I consciously see one on its own."
Female, 33, Retail, NW.

“Yes it’s funny – not very rational of me but I collect from the top of the washing basket and if I do not see any odd socks left in the container I assume I have put it into the basket for the washing machine. Of course socks are small so they tend to slip down to the bottom underneath the larger items.”
Female 30, Solicitor, SE.

“Oh yes – I grab what I can see. I don't dig around, as I am scared that socks will then drop to the bottom of the basket. Of course they are probably there in the first place and I should look harder!”
Female, 64, Retired, NW.

THE CONFIRMATION BIAS AND SOCK LOSS

“If I cannot see any odd socks then there mustn’t be any odd socks” in psychology this tendency is known as confirmation bias.

Confirmation bias occurs from the direct influence of desire on beliefs. When people would like a certain idea/concept to be true, they end up believing it to be true. They are motivated by wishful thinking. This error leads the individual to stop gathering information when the evidence gathered so far confirms the views (assumptions) one would like to be true.

Once we have formed a view, we embrace information that confirms that view while ignoring, or rejecting, information that casts doubt on it. Confirmation bias suggests that we don’t perceive circumstances objectively, we pick out those bits of data that make us feel good because they confirm our assumptions. Thus, we may become prisoners of our assumptions.

This heuristic is based on time saving as well. If there is nothing that I can immediately see that challenges my assumptions then I am reassured I must have it correct.

So in terms of the wash cycle in homes this bias is significantly prevalent. If we believe we are efficient at our job of collecting washing and putting it in the washing machine or even taking items out of the washing machine then we try to stick to information that supports that image of ourselves. So if we do not see any evidence that we have not collected all the appropriate socks up to be washed we believe that we have been effective in ensuring all the socks are together. So people tend to do two very broad checks: 1) scanning bedroom floors for socks and 2) quick scan of the laundry bin once they have collected a pile of clothes up to be washed. The bias is very much based on saving time and effort. Psychologically, confirming something takes us less time and effort than disconfirming something. We want to believe we have all the socks captured in the machine.

INDICATIVE QUOTES:

“I’ve been doing washing since I was 11 so yes I would say I am pretty good at it. I have my routine and usually round things up based on colour and then do a final scan in the laundry bin to make sure I cannot see any odd socks. But they still go missing! I should probably look more closely.”
Female, 41, Financial Services, SW.

“Well I think the best way to ensure everything goes into the wash that should go in is to empty the entire laundry bin each time I do the wash. That way nothing will escape me. To be honest though – that's just too much effort and would take me too long.”
Female, 33, Retail, NW.

“I guess I am a SAS washer. In and out as quickly and smoothly as I can make it. So yes, I probably ‘assume’ I have all the items I should have and probably do a really basic quick scan. If I see no lone socks then I’m straight off to the washing ***machine.”***
Male, 40, Sales, NW.

“Socks can get jammed in the washing machine rim. But I just do what most people I assume do when they take the washing out – just manually spin the drum around and if no soggy socks drop down then I am good to go!”
Female, 41, Financial Services, SW.

BEHAVIOURAL ERRORS - ERROR OF OMISSION AND ERRORS OF COMMISSION

Human error accounts for many accidents, mistakes and mysteries. In terms of the washing cycle there are two sets of influential errors:

Error of omission, where the person fails to respond or do something when they should. Leaving a sock on a bedroom floor, in the laundry basket or washing machine.

An error of commission is one where the person responds or does something where they should not. Putting a lone coloured sock in the white wash, accidently kicking a sock under a wardrobe, placing a sock precariously on a radiator to dry which subsequently falls behind etc.

A whole list of these errors emerged from the interviews:

1. Fallen behind something
2. Kicked/thrown under furniture
3. Adding the wrong colour sock to the wrong coloured wash so it becomes separated from its pair
4. Not secured to a washing line securely so it gets blown off or falls off
5. Once dry pairing the wrong socks up

INDICATIVE QUOTES:

“As I have about a hundred and one jobs to do I tend not to spend too much time paring socks up – I see two dark ones I say ‘snap’ and then move on to the next pairing. We often have to do sock swaps!”
Female, 64, Retired, NW.

“We recently had our living room redecorated. When the painters took the radiator off they found 5 odd socks, a bra and some orange peel!”
Female, 33, Dental Nurse, NE.

“To save time sometimes I just drape items over the washing line. It saves fiddling around with pegs. The downside though is that items have been known to make their way down the street! I remember a rather embarrassed women knocking on my door waving some expensive pink pants in my direction asking if they were mine – I lied of course and said they weren’t!”
Female, 20, Student, NW.

“I decided to spring clean the cats sleeping baskets recently. I found 3 pairs of socks stuffed into the far recesses! She must have found them on the floor”
Female, 56, Nurse, SE.

THE DOUBLE WHAMMY OF THE PHENOMENON OF MISSING SOCKS

Related to the phenomenon of missing socks is the buildup of 'odd pairs of socks' in households. Once socks become separated from their original pairings and go missing they create another issue: the buildup of 'odd socks'. There has already been research into this effect – termed 'Murphy's Law of Odd Socks', which states that if they can be created, they will be.

Research based on probability theory[1] reveals that the chances of socks separating and then going on to form odd pairs is statistically high. The mathematical implications of the 'Law of Odd Socks' are based on the following surprising factors:

1. There really is a genuine tendency for odd socks to build up rapidly. The Law of Odd Socks shows that even if every sock faces the same chance of going missing, their loss is much more likely to break up a matching pair than to rid us of odd socks already created. As such, Murphy's Law of Odd is based in fact.

2. The "real life" implications are even worse, because once created, odd socks are usually left in the drawer, while we rummage through the rest looking for a complete pair. On finding such a pair, we then wear them, put them through the laundry – and thus expose them to the risk of being broken up, further accelerating the creation of odd socks.

3. The process of odd sock creation is astonishing powerful. The Law of Odd Socks implies, for example, if we start with a collection of five complete pairs of socks (10 socks in all) and lose just three socks, the most likely outcome is that we're left with only two matching pairs.

4. Worse, after losing just six socks from such a collection, the most likely outcome is to have no complete pairs left at all.

5. Starting with a larger collection of 10 complete pairs (20 in all), and losing just seven of them, the most likely outcome is that we end up with only three complete pairs, lost among seven odd ones. No wonder complete pairs quickly become so hard to find.

1 Matthews, R.A.J (1996): Odd Socks: a combinatoric example of Murphy's Law *Mathematics Today* March-April 39-41

PHASE 2 QUANTITATIVE SURVEY RESULTS

Sample of 2000 people who are responsible for the washing in their household.

OVERALL DEMOGRAPHIC STATISTICS:

Gender	%	Responses
Female	51.90%	1038
Male	48.10%	962

Region	%	Responses
East Anglia	5.50%	110
East Midlands	4.60%	92
London	15.75%	315
North East	6.25%	125
North West	13.00%	260
Northern Ireland	2.70%	54
Scotland	8.50%	170
South East	9.95%	199
South West	8.40%	168
Wales	5.30%	106
West Midlands	8.85%	177
Yorkshire and the Humber	11.20%	224

MAIN STATISTICALLY SIGNIFICANT FINDINGS:

Overall there washing behaviours, attitudes and results were fairly comparable across all the regions sampled. However there were a number of significant differences.

1. On average a person loses an average of 1.3 socks per month in the washing cycle which equates to 15.6 socks each year. According to the ONS the average Brit will live to 81 years - and thus likely to lose a whopping 1,264 socks lost over their lifetime!

2. Coloured socks are the most likely type of sock to go missing (55% likelihood) compared to any other type (white, stripy, spotty etc.) which have on average 43% chance.

3. The average household does 2.45 washes per week - 127.4 washes per year and 1,274 washes per decade.

4. 16% of people stated that doing the laundry was a waste of their valuable time – but only 16% of people admitted that washing was ‘hard work’.

5. Half (50%) of the people asked admitted to actively disliking the smell of washing detergents yet 65% of them said they love the smell of washed clothes!

6. The biggest concern beyond sock loss during washing was colours running - 19% of the people surveyed admitted that was their main anxiety.

GENDER DIFFERENCES

7. In terms of gender differences women on average take charge of three washes per week, while men are responsible for two washes per week.

8. 70% of women admitted they find the laundry process stressful with 9% of these rating it very stressful. Men find the process less stressful with 58% rating it stressful and 9% very stressful.

9. But 46% of women did not see the washing process as a waste of their time – while only 38% of men thought the same.

10. Women were also far more likely (44%) to report a feeling of satisfaction on seeing the clean washing hanging out to dry than men (26%).

REGIONAL DIFFERENCES

11. People in the Midlands have the highest probability of sock loss (admitting to 1.64 socks going missing each month – 19.68 socks per year) than any other region (those in East Anglia only admitted to losing 1.18 socks per month – 14.16 socks per year).

12. People in Northern Ireland were responsible for significantly more people on average in terms of clothes washing than all the other regions surveyed (2.74 people) and also did significantly more washes per week (2.74) than any other region.

13. People in the North East are significantly more likely to personally collect dirty clothes from different locations rather than collect them from a central laundry bin (24% compared with the East Midlands where this was only true for 9%).

14. Participants in Northern Ireland were significantly more likely (30%) to worry about colours running as their main washing concern than other regions (30% compared with the North West where this was 15%).

15. People from the West Midlands were significantly more worried (21%) about clothes not smelling fresh enough than any of the other regions. (In Northern Ireland only 5% had this concern).

16. Participants from Yorkshire stated that they felt significantly less appreciated for doing the washing than any other region! 33% of the people from Yorkshire stated they felt seriously under appreciated in this.

The overall mathematical probability of socks loss is predicted by the following contributing factors: laundry size, washing complexity, practical attention and overall positive or negative attitude to washing in general.

These emergent statistically influential factors make sense as they incorporate all the psychological bias's that emerged from the interviews:

- 'Laundry size' is a contributing factor as it incorporates how often and how much is washed. Amount and repetition obviously increase the chances of a sock going missing in the process. It also involves more chances of the errors of 'omission and commission'.

- ‘Laundry complexity’ is influential as it includes the diffusion of responsibility (the more people involved in the washing cycle). It also involves more chances of the errors of ‘omission and commission’. Finally there is a high chance of the availability heuristic kicking in here as well.

- Degree of ‘practical attention’ actually acts to stop sock loss. As the more attention you pay to items in the pre-wash cycle (checking pockets, unrolling sleeves, turning clothes the right way, unrolling socks) the more likely you will spot that a sock is missing or an incorrect colour sock has been added.

- The influence of having a ‘positive attitude’ to doing laundry (measured by the less you dread, worry, or dislike doing washing) in stopping sock loss is also an interesting finding. Psychologically the more we dread something the more we want to ‘just get it over and done with’ and so we concentrate on the overall experience (just getting it all washed and dry) rather than the specific details (have I got all the correct items and am I washing these things correctly) etc.

THESE FACTORS FORM A PREDICTIVE ‘PROBABILITY OF SOCK LOSS’ FORMULA:

Laundry size

(Calculated by multiplying the number of people in the household x frequency of wash)

Plus

Washing complexity

(Calculated by adding how many types of wash + number of different temperatures used + number of socks washed + how many people do the wash)

Minus the sum of

Degree of practical attention

(Which is more powerful the more of these you do before you put a wash on: checking pockets, unrolling sleeves, turning clothes the right way, unrolling socks)

Plus

The positive attitude to doing laundry

(Measured by the less you dread, worry, or dislike doing washing)

These factors allow people to establish their own probability of losing socks.

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AddWash™ – Designed for ultimate convenience. Pause and open the innovative **AddWash™** door anytime when the drum temperature is below 50º to quickly drop in anything extra during the wash – whether that's a stray sock you missed, extra softener or a hand-washed garment for final rinsing.

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