

# *Malt Maniacs E-pistle #2012-01*

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# THE TASTE OF CHILL FILTRATION

## A Follow up to E-pistle #2011-01

### BACKGROUND

In June, I wrote an E-pistle entitled "Chill Filtration and Cloud Formation in Whisky" covering the ins and outs of the chill filtration of whisky. I looked at what it is, why it is done, and some of the ramifications of doing it vs. not doing it. What I did not discuss, was how chill filtration changes the flavour of whisky and whether or not non-chill filtered whisky tastes better. I specifically avoided this aspect of the topic for two reasons:

1. I had no good data (though I had an opinion)
2. I didn't want to start a fight!

But for me, the questions remained. What does chill filtration do to the flavour of whisky? Does it taste better or worse? Does it affect certain flavours rather than others? Does it change the mouthfeel? I really wanted to know. Apparently, great minds think alike. On his blog, Oliver Klimek detailed his experience with a very successful home chill filtration experiment, but by his own description, it did have some limitations – one whisky, one taster, and it was not a blind tasting. (I'll let you discover Oliver's results for yourself: <http://www.dramming.com/2011/08/24/chill-filtration-does-make-a-difference-the-experiment/>)

### OBJECTIVES

I decided. It was time to get some more data and it was time to express an opinion in this great debate.

**OBJECTIVE 1:** Get good data on how chill filtration affects the taste of whisky

**OBJECTIVE 2:** Share my results (and maybe join in the fight!)

You're reading this, so it's clear that I have met the second objective, at least partially. The first objective requires a much more detailed explanation. To ensure transparency, I'm going to start with considerable detail on my procedure, before moving into results and conclusions.

## PROCEDURE PART 1 – HOME CHILL FITRATION

Finding two whiskies from the same cask or vatting, one of which has been chill filtered and one of which has not, is an extremely difficult task. A privileged few distillery workers and owners may get that chance, but for the rest of us, it's almost impossible to buy or otherwise procure the samples. We have to make them ourselves.

I chose four non-chill filtered whiskies, and set about making my own chill filtered versions at home. The household freezer was commandeered, my wife's patience was tested, and four chill filtered whiskies were produced. The four whiskies were:

- Glendronach 6YO (WIT) – 60.8%ABV
- SMWS 95.8 – 59.3%ABV
- Aberlour A'bunadh Batch 24 (OB) – 60.2%ABV
- Ardbeg 10YO (OB) – 46%ABV

The range, as pictured below, was chosen to cover different styles and production techniques including:

- Peated and non-peated
- Sherry and bourbon casks
- Single cask, small batch and standard vatting



Figure 1 – The Whiskies

The home freezer was emptied and cleaned to avoid contamination with stale freezer notes. A friend, who is a biology teacher, provided me some laboratory grade filter papers and I purchased a premium quality plastic funnel. A clean wooden chopping board was placed into the freezer as a flat work surface, along with the four whiskies, the filter papers, and the funnel. They were all left to chill for over 24 hours. The filter papers were sealed in a plastic bag to prevent them from absorbing moisture and odours.

After 24 hours, all four whiskies were examined and all four showed signs of cloudiness, which:

1. Confirmed that they were non-chill filtered
2. Confirmed that they were ready for filtering

One by one, the ice cold whiskies were strained through the filter papers and funnel into clean, dry glass bottles. Between each whisky, the filter paper was changed and the

funnel was washed and dried thoroughly to avoid flavour cross contamination. The freezer remained closed during filtering to keep the cold in, but the samples were checked regularly to ensure the whisky was not exposed to air for any longer than necessary. The bottles were filled and sealed tight as quickly as possible.

After the filtration process was complete, the chill-filtered samples were left in the freezer and then checked for cloudiness. All samples were clear, with no sign of cloudiness, suggesting that the filtration was a success. Hooray, the tedious part was complete and the freezer was free once more for frozen peas and minced pork.

I was now equipped with eight whisky samples – a chill filtered and non-chill filtered version of each of the four whiskies listed above.

## PROCEDURE PART 2 – OBJECTIVE TASTING

I produced 80mL of each chill-filtered whisky, so that there would be an adequate tasting sample for four people (20mL each). I carefully selected the four people based on super intensive criteria.

	Person	Super-Intensive Criteria
1	Emmanuel Dron	Owner / Manager of The Auld Alliance. Whisky collector and writer.
2	Benjamin Chen	Malt Maniac, Whisky Blogger, Whisky Researcher
3	Chad Evans	He provided the filter papers, so I couldn't really say 'no'
4	Me	Come on, it's my experiment!

To be fair, although not a whisky nutter like the rest of us, Chad Evans is certainly a connoisseur of fine food and beverages, with an exceptionally well-developed nose and palate. I also thought that it would be valuable to have input from a non-whisky fanatic. After all, not all whisky drinkers are borderline sociopaths, and Chad does enjoy the occasional dram. As a scientist, Chad was also a big help with the technical side of my original article on chill filtration and my experimental design.

As you read on to the results section, bear in mind that this list contains two full time whisky professional and a Malt Maniac

The tasting was conducted at Emmanuel Dron's bar, The Auld Alliance. The Auld Alliance has the largest selection of whiskies in Southeast Asia, with about 1000 to choose from. The range includes some very old and rare drams, and some beautiful leather couches, so it seemed like the perfect place for some high-brow whisky experimentation.

The bar staff were also immensely helpful, as I was able to hand the whiskies over to them to be poured into glasses and labelled such that they knew which sample of each whisky was which, but we the four tasters did not. Given the passion surrounding the issue of chill filtration, blind tasting was one of my core requirements to ensure objectivity in the experiment. The whiskies were presented in pairs in the order shown above. We always knew which particular whisky we were drinking, but we did not know which of two glasses was chill filtered and which was not.



**Figure 2 - The Auld Alliance: paradise for whisky lovers**

For further objectivity, specifically to avoid the power of suggestion, we were required to nose and taste each whisky, and then record our initial thoughts in silence. We then engaged in general discussion and were allowed to expand our notes, but not to remove anything. Tasting was only done neat, as adding water may have caused cloudiness in the non-chill filtered sample which would have put an end to the 'blindness' of the tasting. For future experiments, I may consider blindfolds.

Each taster was required to record his/her thoughts on nose, palate, finish, and mouthfeel for each whisky. They were also required to score each whisky out of 100, and indicate which of each pair they thought was chill filtered. The score out of 100 was not get a score for the whisky itself, so much as it was to differentiate between the chill filtered and non-chill filtered versions; to see which version each taster preferred and by how much. Note that in the results section as follows, the scores for the original non-chill filtered sample have been set to zero, and the difference in scores recorded under the chill filtered sample notes to get an objective difference in percentage points, plus or minus. It was not our goal to 'score' the whiskies, but to determine how much better or worse the chill filtered version was.

## RESULTS

I don't know how to put this gently, so I'm just going to show you the tabulated results.

Whisky	Taster 1		Taster 2		Taster 3		Taster 4		Total by Whisky		
	CF Guess <sup>1</sup>	CF Lead <sup>2</sup>	CF Guess	CF Lead	CF Guess	CF Lead	CF Guess	CF Lead	# Correct Guesses	Ave. CF Lead	CF is equal or better
Glendronach 6YO WIT	Wrong	+5	Right	-5	Wrong	+5	Wrong	+2	1	+1.75	3/4
SMWS 95.8 (Auchroisk)	Wrong	+2	Right	-5	Wrong	+5	Right	=0	2	+1.25	3/4
Aberlour Abunadh (B24)	Wrong	+3	Right	+10	Right	=0	Wrong	+3	2	+4	4/4
Ardbeg 10YO (OB)	Wrong	+3	Right	+2	Right	-2	Wrong	+2	2	+1.25	3/3

Totals - Taster1		Totals - Taster 2		Totals - Taster 3		Totals - Taster 4		Overall	
Correct Guesses	0	Correct Guesses	4	Correct Guesses	2	Correct Guesses	1	Correct Guesses	7/16
Average CF Lead	+3.25	Average CF Lead	+1.25	Average CF Lead	+2	Average CF Lead	+1.75	Average CF Lead	+2.0625
CF is equal or better	4/4	CF is equal or better	2/4	CF is equal or better	3/4	CF is equal or better	4/4	CF is equal or better	13/16

1. **CF Guess** refers to whether the taster guessed which whisky was chill-filtered
2. **CF Lead** is how many more points (+) or less points (-) the chill filtered whisky was awarded compared to the non-chill filtered whisky

Okay, to me, a few things jump out immediately.

1. We were worse than random chance at picking a chill filtered whisky from a non-chill filtered whisky, picking them correctly in just 7 out of 16 opportunities (43.75%)
2. In 13 out of 16 opportunities, **we preferred the chill filtered version** or considered it equal (81.25%)
3. Every taster, on average, awarded more points to chill filtered whiskies (between 1.25 and 3.25 extra points)
4. Every chill filtered whisky, on average, was awarded more points than the non chill filtered version (between 1.25 and 4 points)
5. Overall, a chill filtered whisky scored approximately 2.06 points MORE than a non-chill filtered whisky

When I conceptualized this experiment, I expected that we would all be fairly good at picking the non-chill filtered whisky, and we would generally prefer the non-chill filtered whiskies. In fact, none of us preferred the non-chill filtered whiskies and only one of us was good at picking them. And experience, is seems, counts for nothing in picking out non-chill filtered whiskies. To protect the guilty, I'm not going to reveal which taster number corresponds to which name, with one exception. It was the LEAST experienced whisky drinker, Chad Evans, who correctly identified each non-chill filtered version as Taster 2, though he still preferred the chill filtered versions on average.

Lets' have another look at those numbers without the influence of Mr Chad Evans. In other words, let's have a look at what the more experienced whisky drinkers have to say.

Whisky	Taster 1		Taster 3		Taster 4		Total by Whisky		
	CF Guess	CF Lead	CF Guess	CF Lead	CF Guess	CF Lead	# Correct Guesses	Ave. CF Lead	CF is equal or better
Glendronach 6YO WIT	Wrong	+5	Wrong	+5	Wrong	+2	0	+4.0	3/3
SMWS 95.8 (Auchroisk)	Wrong	+2	Wrong	+5	Right	=0	1	+2.33	3/3
Aberlour Abunadh (B24)	Wrong	+3	Right	=0	Wrong	+3	1	+2.0	3/3
Ardbeg 10YO (OB)	Wrong	+3	Right	-2	Wrong	+2	1	+1.0	2/3

  

Totals - Taster1			Totals - Taster 3			Totals - Taster 4			Overall		
Correct Guesses	0		Correct Guesses	2		Correct Guesses	1		Correct Guesses	3/9	
Average CF Lead	+3.25		Average CF Lead	+2		Average CF Lead	+1.75		Average CF Lead	+2.33	
CF is equal or better	4/4		CF is equal or better	3/4		CF is equal or better	4/4		CF is equal or better	11/12	

The shocking truth is:

1. We were even worse at picking which whisky was chill filtered, being right only 33% of the time – far worse than guessing
2. We preferred (or equally liked) the chill filtered version 91.67% of the time
3. We preferred the chill filtered version by a higher margin, now 2.33 points on average rather than 2.06

## **ANALYSIS AND CONCLUSIONS**

I may be stating the obvious here, but I am extremely surprised by these results. After the tasting was finished, and the identity of each whisky was revealed, I was incredulous. Flabbergasted. My first step was to check with the person who helped to deliver our samples as blind, to ensure that she hadn't made a mistake. Alas, she had not. It was the whisky drinkers who had made the mistakes in their guesses.

Tasting notes from the session tended to show that there was some agreement amongst the tasters on what each of the different versions (chill filtered and non-chill filtered) smelled and tasted like. More significantly than the agreement on what the whiskies taste like, is the general agreement on HOW they are different. This leads to a very obvious conclusion:

### **1. Chill filtered whiskies taste different to non-chill filtered whiskies**

While this may be obvious and expected, it is also a very important conclusion. The conventional wisdom is that chill filtration is undertaken for purely aesthetic reasons, to ensure whisky does not go cloudy when it is cold or diluted. But all tasters consistently noted throughout the experiment that the whiskies smelled and tasted different. Based on this experiment, I would now strongly challenge anyone who said chill filtration was purely an aesthetic change that does not impact upon aroma and flavour. I should also note that this conclusion is completely consistent with Oliver Klimek's findings.

### **2. Non-chill filtered whiskies do not taste better**

Though the scoring indicates a general preference for the chill filtered variants, I am not going to stretch the results to state categorically that "chill filtered whiskies taste better than non-chill filtered whiskies". While the experiment was broader in scope than any other experiment on chill filtration than I am aware of, I do not feel that there is enough data to conclude that chill filtered whiskies are inherently better. However, I am confident in concluding the *absence* of a clear rule – there is certainly no evidence from this experiment to suggest that non-chill filtered whiskies taste better.

### **3. Whisky drinkers are not necessarily very good at differentiating between non-chill filtered and chill filtered whiskies**

I used to think that picking a non-chill filtered whisky from a chill filtered would be easy – I could just identify which whisky was more oily and unctuous and that would be the non-chill filtered whisky. This experiment showed that experienced whisky drinkers are not particularly good at doing this, and our prejudices about what the difference SHOULD taste like may severely impact our judgement. The fact that the three more experienced whisky drinkers had a success rate of 33%, far worse than random guessing, suggests the presence of some form of bias. This leads to another conclusion.

### **4. Chill filtration doesn't necessarily change whisky in the way we expect**

In fact, a success rate that is worse than random guessing may suggest that to some extent, chill-filtration is doing the opposite of what we expect. Indeed, for the taster that got zero correct guesses, a simple reversal of their assumptions could easily make them 100% correct. As mentioned above, notes from the session show some level of consistency in regards to nose and palate, but the notes on mouthfeel are quite inconsistent, suggesting that mouthfeel terms are understood and used very differently. Our scientist and whisky amateur tended to differentiate between viscosity and oiliness, where as the whisky drinkers didn't. And while it may be a truism to say that a scientist will be better at objective analysis than a passionate connoisseur, these results appear to make that point very eloquently.

## LIMITATIONS

I expect these findings to be controversial. I expect surprise and disbelief, and I even anticipate some angry responses. I want to pre-emptively address this in two ways.

1. This is unequivocally not the result I wanted or expected. However, I went to considerable lengths and effort to ensure this experiment was done with as many controls for variables as possible, and to ensure that the tasting was blind. I always believed that non-chill filtered whisky would taste better and the last thing I wanted was to be wrong. I can no longer honestly say that I believe that non-chill filtered whiskies taste better, though nor will I confidently claim that chill filtered whiskies are better.
2. This was the biggest experiment of this type that I know of. That said, it was still quite small. In many ways I consider these to be "interim results" with "provisional conclusions". I am certain that this is not the last word to be written on chill filtration. Nonetheless, I pursued my experiment as rigorously as possible, and have made my methodology as transparent as possible. I welcome any and all (polite) challenges to methodology, and more than that, I welcome results of a repeat experiment that addresses any deficiency in my methodology.

I'm going to start the ball rolling with some limitations that I have already identified in the experiment

- a. Sadly, chill filtration is not usually done in my freezer. Obviously, the methods employed by distillers and bottlers are different in practice, though not in theory. The scale is also quite obviously different.
- b. We only used four whiskies. This is a good start, but if we want to approach this statistically, we would need a lot more
- c. We only used four tasters. Again, this is a good start, but if we want to approach this statistically, we would need a lot more
- d. The tasters, as whisky drinkers, have prejudices about whisky. (Though this is inescapable, as if you were to run the experiment with a large population of non-whisky drinkers, you are going to get results that don't necessarily apply to whisky drinkers anyway.)
- e. Three of the whiskies were cask strength and results may differ at lower concentrations of alcohol. Unfortunately, if we had allowed the addition of water, cloudiness in the non-chill filtered variants may have destroyed the 'blind' element of the tasting. Blindfolds are a good option for future experiments.

If anyone is considering repeating this experiment, I humbly suggest that they use more whiskies and more tasters. Furthermore, I suggest that they stick with either cask strength whiskies, or whiskies around the 46% mark. The results may differ significantly between these two categories.

## A FINAL WORD

So, where do I stand now? I used to wish that distillers would just leave the whisky alone and sell cask strength, non-chill filtered, caramel free whiskies. Having been through a blind tasting where we generally preferred the chill-filtered whiskies, how do I feel about chill filtration now?

Strangely, I'm still against it. Whisky is a delightful creation from barley, water, yeast, peat, a cask, stills, and the skill of artisans. From these basic inputs, we get a multitude of wondrous flavours to explore. From these simple origins arises a fascinating complexity that has kept me engaged for more than a decade, and will undoubtedly keep me engaged for several decades to come. I want to explore the multitudinous outcomes of these raw ingredients, without any changes after the whisky leaves the cask. No dilution, no chill filtration and no caramel.

To be sure, it's a romantic position, not an objective scientific position. And while I'm a big believer in scientific exploration and discovery, at some point, it's not about rationalism. I love coffee, but when I explore a rugged nature trail I don't want to see a brand new cafe on every twist and turn of the track, I want to enjoy the natural environment for what it is. When I drink whisky, it's about sitting down with a great dram – the pure expression of raw ingredients and the whisky maker's art. I want to drink whisky for what it is.

At the very least, I feel extremely strongly that whisky producers should indicate on the label whether their whisky has been chill-filtered or not. As I now know for certain that it can influence flavour quite dramatically, I feel consumers should have simple access to the information.

Okay, let the fight begin!

## THANKS

Before I sign off I would like to thank:

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- Mr Benjamin Chen for his participation
- All of the above for their ongoing friendship
- Mr Oliver Klimek, for inspiring me to write this paper
- You – for reading this far!



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