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Research paper

Concepts of illicit drug quality among darknet market users: Purity, embodied experience, craft and chemical knowledge

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ABSTRACT

Background: Users of darknet markets refer to product quality as one of the motivations for buying drugs there, and vendors present quality as a selling point. However, what users understand by quality and how they evaluate it is not clear. This article investigates how users established and compared drug quality.
Methods: We used a two-stage method for investigating users' assessments. The user forum of a darknet market that we called 'Merkat' was analysed to develop emergent themes. Qualitative interviews with darknet users were conducted, then forum data was analysed again. To enhance the applicability of the findings, the forum was sampled for users who presented as dependent as well as recreational.
Results: Quality could mean reliability, purity, potency, and predictability of effect. We focused on the different kinds of knowledge users drew on to assess quality. These were: embodied; craft; and chemical.
Conclusion: Users' evaluations of quality depended on their experience, the purpose of use, and its context. Market forums are a case of indigenous harm reduction where users share advise and experiences and can be usefully engaged with on these terms.

The existence of on-line darknet markets for the sale of illegal products and services – mainly controlled drugs - has attracted attention and commentary since the creation of the Silk Road marketplace in 2011. Darknet markets or 'cryptomarkets' are accessed using systems that route internet traffic through a set of relays. These disguise where that traffic originates and goes to and can also encrypt it to make it resistant to interception. 'Tor' (The Onion Router) is the most popular at the time of writing but 'i2p' (The Invisible Internet Project) and 'Freenet' are also used. Market administrators, vendors, and buyers are therefore not easily traceable. Users may create further layers of anonymity such as employing the Tails (The Amnesiac Incognito Live System) operating system and associated encrypted communication systems such as PGP (Pretty Good Privacy). Transactions are conducted using peer-to-peer currencies such as Bitcoin, Litecoin, Dogecoin, and Darkcoin, which can permit anonymous transactions to be recorded. Bitcoin was the only currency employed in our study. Market transactions often have a laundering or 'tumbling' process for the currency in order to put distance between the user's real identity and darknet accounts. Their current importance should not be overplayed. Their revenue is a small proportion of the illicit economy, and there are many other ways of acquiring drugs using the internet (Meyers et al., 2015; Race, 2015). However, their rapid rise to prominence, novel form of organisation, emphasis on choice and customer feedback, and use of encryption technology, make them a topic of interest as a new context of drug use (Duff, 2007).

Research on the darknet has identified an emerging set of dispositions and practices that consciously reject the risks and vagaries of off-line markets and encourage savvy, reflexive consumption (Van Hout & Bingham, 2014). Quality, predictability, reliability, and safety are often referenced as reasons drug users and vendors purchase and sell on the darknet as opposed to off-line or 'street' markets (Van Hout & Bingham, 2013a, 2014). They enable drug user identities that emphasise calculated hedonism and connoisseurship, the selection and comparison of different products, and elaboration of the precise effects with in-depth trip reports (Riley, Thompson, & Griffin, 2010; Van Hout & Bingham, 2013b). Reflecting that orientation, Silk Road users primarily bought MDMA, 2-C drugs, cannabis, and LSD (Barratt, Ferris, & Winstock, 2014). As noted in our own study, darknet markets have evolved since Silk Road's closure to sell many more types of drugs,

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with expanded listings for pharmaceuticals and opioids. We wanted to see how these associations of cryptomarkets facilitating connoisseurship applied to a wider range of drug users, including users of drugs typically represented as dependent, and those who present themselves as dependent.

This article explores the kinds of knowledge darknet users evaluate and bring to bear in assessing product quality, by which we mean the characteristics that make the drug effective for the user. Our perspective is that drug users and dealers are producers of knowledge and expertise (Jauffret-Roustide, 2009). Following that we treat quality as a characteristic generated in the interaction between the user and the drug, rather an attribute of the chemical substance that can be evaluated independent of the user's subject position. Our focus is the way users orient themselves through the use and sharing of knowledge about product quality. This can happen in a variety of ways: through the formal product evaluation mechanism built into sellers' listings, via the associated discussion forums, in related open internet forums such as comment threads on the reddit community, and in buyers' personal discussions with other users. This can be used to investigate users' priorities in using the markets, the benefits they seek through their drug use, and their assessment of risks.

We have used the term 'off-line' to represent the various ways of acquiring drugs that do not involve the internet. The term covers deals done in private settings and in open-air street markets. These are very different settings. As we will show, 'street' was a usually negative term used by many users for the off-line markets and we have used it to represent the distinction they were drawing between markets. However, we do not intend to suggest that off-line markets are typically unreliable, which is far from the case. Respondents to one survey gave the adequate local supply as a reason for not purchasing from Silk Road (Barratt et al., 2014). For both on- and off-line markets reliability must be produced by the actions of those involved (Sandberg, 2012). On-line markets are also not distinct from the off-line. Instead, they combine in novel ways. Users combine both sources in their drug purchasing. Product for off-line resale is purchased on the darknet, and dealers use it for business to business deals (Aldridge & Décary-Hétu, 2014). The existence of cryptomarkets and other on-line sources do, however, potentially affect the overall market structure. An example of this would be the shortening of supply chains (J. Martin, 2014).

Drug quality is a subject about which there is considerable uncertainty (Evrard, Legleye, & Cadet-Taïrou, 2010; Reuter & Caulkins, 2004). Research involving users who purchase in off-line settings indicates that they are often unsure of how to assess the quality of purchased drugs and how to ensure consistent and predictable quality. They are often reluctant to question drug dealers about quality and in the main do not see dealers as a reliable source of information about it (Best et al., 2004). We cannot assume that dealers have perfect information on the quality of their product either. For dealers in off-line markets, quality is difficult to demonstrate and the opportunities for price signalling are limited (Reuter & Caulkins, 2004). To some extent, the orientation to quality adopted by the user reflects the power they have in relation to the market and the opportunities for information sharing (Mars et al., 2015). In cases where users have greater choice and opportunity to obtain drugs from different sources and compare experiences they are able to be more evaluative of product quality. For example, cannabis grower-consumers are highly critical of quality available in the market (Decorte, 2011) and information about quality is distributed and compared through cannabis social clubs (Decorte, 2015). Despite this, like the wider population, dealers and users share myths about quality and adulteration, such as the common myth that drugs are regularly cut with harmful substances (Cole et al., 2011; Coomber, 2011; Decorte, 2011).

There is growing use of various on-line platforms through which shared narratives are generated to frame effective ways of using, experiencing and evaluating drugs (Rosino & Linders, 2015). They have the potential to contribute to peer harm reduction through expanding the range, depth and diversity of users' interactions with peers (Van Hout, 2015; Van Hout & Hearne, 2015). Darknet drug markets are a particularly interesting case for exploring users' assessments of quality. Off-line markets rely on repeated transactions, shared culture and some sharing of market intelligence on product quality where possible (Dwyer & Moore, 2010). Cryptomarkets must find other ways to ensure transactions happen. Vendors make claims about the various qualities of their products to which users compare their own evaluations (Buxton & Bingham, 2015). Users are encouraged to rate the product and discuss their qualities, effects, and techniques of production and use with other users and vendors. An assumption found in much of the justificatory commentary on darknet markets is that they make the problem of quality transparent. For example, a group called The LSD Avengers tested the purity of LSD purchased on the Silk Road and posted the results on the market forum.

It is implicitly assumed that quality equates to chemical purity. Though part of the equation, this approach tends to present each drug as an entity with singular effects tied to its inherent chemical nature (Dwyer & Moore, 2013). We find it more productive to treat the drug as an unstable object that is generated in the practical application of knowledge and technique by producers, distributors and users (Gomart, 2002). That fact is implicitly recognised in users' own practice and discourse (Dwyer, 2008; Moore & Measham, 2008). Users discuss, share ideas and reflect on how to maximise desired effects (Jacinto, Duterte, Sales, & Murphy, 2008; Southgate & Hopwood, 2001). Emerging from this theoretical stance, we hypothesised that the use of different forms of knowledge were key in shaping different users' assessments of what drug quality meant and which products were of better or worse quality. The knowledge used is crucial because it configures the drug, the user and the context of use. This configuration is a process of assembling knowledge about drug effects, quality, pharmacokinetics, the user's body and psychology, and the setting of use into a stable, coherent object (Duff, 2011; Zinberg, 1984). We draw on the distinction between the raw and the cooked made by Claude Lévi-Strauss (1969). Users 'cook' in the sense meant by him, working on the raw substance to produce an entity that is a culturally meaningful, useable drug. Our perspective recognises users' own agency and self-organisation in managing risk and reducing harm (Friedman et al., 2007). It also recognises that agency as structured and contained (Rhodes, 2009).

Methods

In order to cross-check and triangulate data we used qualitative interviews and posts on the user forum for a darknet market that we have anonymised as 'Merkat'. Merkat is, at the time of writing in October 2015, one of the major darknet markets. It was established in late 2013 and has benefited from the law-enforced or scam-induced closure of competitors. Merkat has an associated forum. The forum is broad-ranging and lively. Discussions of both vendor and product quality form a large part of the forum. Research in this area involves developing ethical practice in a set of communities where 'hidden' is the norm. In line with good practice we attempted to contact the marketplace and forum organisers about our research (Barratt, 2011). We waited one month for a reply but did not receive one. We then decided to proceed with data collection as the forum is public and the forum rules did not restrict research. We chose to anonymise the marketplace itself as we did not have permission from the administrators to identify it in published work. Although the forum is publicly accessible,

anonymisation was in line with the norms involved in users' interactions with the market, which emphasise the use of multiple anonymising practices (Association of Internet Researchers, 2012). Quotes from forums are paraphrased to ensure users cannot be identified through searching. When paraphrasing we preserved tone, style and meaning. We used square brackets to explain common phrases. There is a loss as the original posts are not presented here, however, we aimed to preserve the emotional and expressive tone of the words used. We did not post about our research on the forum as new users were restricted to a 'noobs' thread until 20 posts were made. We felt that posting the same information 20 times would have been spamming. Approval for the study was received from the University of Edinburgh School of Social and Political Science research ethics committee. Names of interviewees and forum users are pseudonyms.

Five interviewees were recruited using word of mouth during summer 2015. Interviews were used to explore emergent themes from the initial coding. Interviewees had used a variety of markets, from the original Silk Road to the many other darknet markets currently live, including Merkat. Interviews were conducted face to face, by Skype, and by encrypted chat systems. The content of relevant threads was entered into the qualitative data management programme Nvivo and coded automatically and by hand. The database of consisted of 152 threads, ranging from 20 to 7,000 posts on each thread. Forum data covered the 2 year period from its creation. We lurked in the forum from March to May 2015 and collected the posts in May. In total 3196 text elements were coded for this article. Coding was carried out until the codes exhausted the data and no new material had to be coded. We continued coding forum data and reviewing the emergent coding themes alongside interviewing. Initially, we simplistically interpreted 'quality' as a term used by forum users and interviewees to mean 'good' or 'chemically pure'. As coding went on it became apparent that to make assessments of quality users were employing knowledge judgements with very different epistemological groundings, from the experiential, based on personal reports of their and others experience with the drug, to positivist claims about chemical content.

One advantage of research with darknet users on this topic is that forum discussions and interviews relate directly to specific product purchases. Vendors make claims about their product's quality. Users discuss various aspects of the drug purchased when comparing quality and forum users feed this back to their peers. It makes for very rich data with intricate and thoughtful reflections by users on their criteria for evaluating drug quality. The forum discussions were especially useful in broadening the data sampling. Our interviewees were young (20–25 years), male and had college degrees. They self-identified as recreational and weekend users for whom choice and variety is paramount in their decision making about drug purchases. In the main they used psychedelics, cannabis and ecstasy, and described their motivations as pleasure and self-exploration. For them, quality tended to be an 'either/or' judgement: it was pleasurable or not. The forums expanded our focus to users with a wider range of social backgrounds, whose self descriptions indicated they were in relative poverty, or otherwise precarious personal situations, and some who identified as female. Forums included users of heroin, other opioids, cocaine, methamphetamine and pharmaceuticals, and users who presented and self-identified in forums as dependent, referring to themselves as 'addicts' or 'junkies'. This gave us an insight into users who seek and value very different qualities in a drug from recreational users, such as being able to use it while working, or to manage withdrawal symptoms. This division between recreational and dependent use was helpful in understanding the range of motivations users had in seeking out and assessing drug quality. However, care should be taken in applying this typology which can be used to stigmatise some users and de-legitimate their accounts (Carnwath & Smith, 2002). Many forum users who self-identified as dependent also reported using drugs recreationally at the same time or at different points in their life course, and some had moved from dependent to recreational use and vice versa at the time the study was conducted.

MOTIVATIONS AND ORIENTATIONS

As we show in this article, quality has different meanings: it can stand for reliability, chemical purity, effective potency, predictability of effect, security of supply and financial value. Unsurprisingly for committed darknet users, they all agree on one point: whatever it meant, quality is expected to be reliably high on the darknet. We found that users have already made use of off-line markets, and 'street quality' is a commonly used term for the lowest quality product. As one interviewee explains, although it is possible to obtain good quality products in the off-line markets, it is not possible to do so reliably or as cheaply:

> The average for stuff that is available on the darknet, and that's for across the board pretty much every drug I have seen, stuff that I would never consider buying but I've seen reviews for things, that's on par with the best things you can get on the street here. Best weed [cannabis] I ever had, the pills I got there were equivalent to, I'm not sure what the current big one is I think it's UPS [ecstasy brand] are the big popular ones just now. It's equivalent to the best you can get on the street. So I mean, these were people already selling very high quality so it was about the same quality as before but they would get it much cheaper.
>
> Interviewee 'Al'

Darknet markets also provide variety and the ability to select specific products that were not available on the local market. Users found personal enjoyment in making use of the darknet and developing and using their digital knowledge and exploring the range of different options available to them.

> There's a few reasons for why I started buying on the darknet originally. While I can't remember what the most important reason was back at the time, it was probably to do with the general quality of products that you could receive via the markets; certainly a lot better than what I used to get back at home (which is thanks to a feedback system which puts it in the seller's best interest to actually sell what they claim to sell). ... While it might take some time to get your head around how to use it and some dedication, once you get started it gets easier, though it's not to say that you don't run into issues every so often.
>
> Interviewee 'Doc'

A more general sense of personal dignity is also enjoyed as a benefit, and this was repeated in many forum discussions:

> I'm glad I could kind of share my experience just because when it happened I was so happy that it existed, and I think, as you said, it gets a bad rep. I never felt like I was a criminal for using it you know. I guess everyone would say that
>
> Interviewee 'Sel'

Although they are often skilled users of the off-line markets, forum users and interviewees prefer the more respectful, professional and less stigmatising interactions open to them through the darknet. They experience a developing sense of agency and control over their drug-buying that is harder to achieve and

reliably maintain in off-line transactions. In part, their satisfaction involves a 'rational consumer' mentality that emphasises choice, variety, value and quality of product, and that minimises possible harm (Van Hout & Bingham, 2013b). It also includes the opportunity to demonstrate their own knowledge and ability in relation to peers and law enforcement, such as using encryption to defy police surveillance on-line and off-line. These 'seductions of crime' (Katz, 1988) are subtle and take place in the satisfaction of achieving successful transactions and demonstrating one's ability to interact with systems such as bitcoin, Tor and Tails. This sense of agency often bleeds into a libertarian, anti-interventionist stance regarding drug prohibition and the role of the state, sometimes proclaimed in the sites' own documentation. That contrasts with attempts by law enforcement to portray the darknet as a harmful, criminal morass (J. Martin, 2014). Having said that, many users and market owners are simply pragmatists weighing up the costs and benefits and who enjoy demonstrating their digital nous.

It is notable that a rational consumer orientation is not confined to recreational users. Users who present themselves as dependent also employed these methods of evaluation. The salience of different factors varied, however. One important consideration was having the right combination of heroin and opioid to avoid withdrawal while working:

> Mate, I have some subs [buprenorphine] at 2pm, just before I'm off to work. It gives a small energy kick, or it holds off the dopesickness when I've used up all my junk after a session. I get off work at 12, I'll take a hit right then. Taking H [heroin] after subs reduces the impact of the H, terrible.
>
> Forum user 'Smartbags'

Like others, this user combined heroin with other opioids to manage the effects of withdrawal and cravings and to fit it in with work life. Other users mentioned similar patterns of use in relation to family and social obligations.

From forum discussions, customers experiencing withdrawal symptoms, and looking for relief from them, emphasise rapid despatch and delivery as a valued quality in a vendor. This is evident from the heroin/opiate threads where discussions of withdrawal were common:

> Colour me slightly pissed. First of all, I adore [vendor] 0Bummer–he is the biz [business]. Well, he was meant to ship my stuff on Wednesday. He gets back to his house and sees my shipment sitting there. He'd forgotten. Right away he pm'ed [messaged] me which I really like as vendors don't usually admit to mistakes. He said that because I am a regular customer I would be pleased with my bag (sounds like extras!) and he would send it UPS [parcel delivery] overnight guaranteed next day delivery. But nada came in the post today. So I will be [dope]sick for the rest of the week. I finished my heroin yesterday and it was VITAL that this shipment arrived. Yuck, feeling sick already. 0Bummer made an honest error and is trying to fix it. I'm not holding him responsible–I blame the tropical storm down here and UPS.
>
> Forum user 'Nevertrustahippy23′

Many heroin users expressed the need to achieve a stable, predictable effect that would deal with their dopesickness (heroin withdrawal) and allow them to continue their social, familial and employment obligations without interference. For these users, the vagaries of the vendors and various national postal services becomes part of the material risk of withdrawal. Vendors could recognise this and some forum users said they had prioritised orders for buyers who had told them they are going to experience withdrawal.

> These vendors are pretty sympathetic to us junkies and the dumb stress we have waiting for our junk
>
> Forum user Slaphappy

Vendors taking on a customer service role helping users avoid withdrawal is in stark contrast to the dismissive attitude towards dopesickness displayed by dealers in contexts where users are highly marginalised (Bourgois, 1998), and the willingness of dealers in some off-line markets to rip off weaker, irregular and addicted customers (Jacques, Allen, & Wright, 2014). It suggests a very different power relationship where vendors are, to some extent, at the mercy of users' evaluations of them, something they sought to manage.

PRESENTING PURITY

Purity took on three meanings in users' accounts: it could mean a sense that the drug is in an uncontaminated state, that it is in an ideal state for achieving the desired effect, and to refer to the drug's chemical strength. Vendors usually list claims about purity in the last sense; cocaine, for example, is sold as 'pure, uncut, 80% + ', 'purity tested', 'Scott tested' and mephedrone as '97% pure'. Other listings make reference to general purity without making numerical claims. Cannabis listings feature more claims about effect and plant qualities with less focus on the strength of active agents in the drug. Other claims of implied purity are made by reference to region of production, such as Dutch MDMA or Colombian cocaine, or by brand (Lee, Battle, Soller, & Brandes, 2011). Vendors also grade their products to sell to different markets, dealers and users, smokers and intravenous users. Heroin is offered by the same vendors in different grades, for example 'potent' or 'extreme'. They also sell different types with characteristics suitable to injecting or smoking.

Initially it seemed as if chemical strength and consistency is used as the main metric of purity. When examining threats to purity it became apparent that, for heroin users, effectiveness did not easily map on to the chemical purity of the drug. Heroin of lesser purity could give a better 'rush'.

> [Vendor] SilverLining's number 4 [heroin] is no great shakes in the rush stakes. It is meant to be very pure. It was creeper H which does not have the identifiable rush like the best black tar [heroin] or china white. Therefore I combine it with morphine, which gives a pleasant rush (it's my thing).
>
> Forum user 'FreakBEat'

This highlighted how idea of purity as 'close to the ideal' could be separate from purity as chemical strength or uncontaminated. For cocaine and heroin particularly, users noted a practical difference between cutting as bulking out, and adulteration to enhance or change the high (Coomber, 1997a, 1997b). They also perceived an ethical distinction between different motives for adulteration. Adulteration could be seen as useful or as deceptive. When perceived as deceptive, users interpret adulteration as being used to mask the vendor bulking out the drug to increase profit and an attempt to give the false impression of potency. When seen as useful it could be interpreted as the vendor enhancing the drug's effects in some way. That might be increasing the length of the high, or changing the shape of the high, for example, creating a longer and more sedating 'tail' to the experience.

> Well it was yours truly and a few dudes trying out the coke yesterday. I gummed some first and the numbing slowly kicked in. We kept on with this until about 3am and we had about a g[gram] left which is not typical. Today: no stuffed nose, had a restful night, and it's a normal day on the road! My assessment

> is that this won't test as pure for cocaine as someone like [vendor] StraitOuttaTrumpton who's got the purest coke you can find but it is up there. Buy? God yeah!
>
> Forum user 'Schnellman'

Adulteration could also involve changing how the drug looked or felt: making lower quality powder methamphetamine look like crystal, for example. These characteristics were taken to demonstrate the authenticity of the drug and the production process

> They import meth from the USA but they don't use the lithium/ammonia 'shake'n'bake' method or the racemic method–you get crank [methamphetamine] stuck into big white bits so it looks like crystallised d-methamphetamine or Ice. They use the better iodine and red phosphorous method. British meth uses phosphonic acid which gives a cleaner end result.
>
> Forum user 'HappyDaze'

As this forum quote illustrates, a range of experience and knowledge is used to assess purity. However, potency was not completely analogous to the drug's chemical purity. Potency might indicate the drug had been adulterated, as did absence of negative effects:

> It seemed potent, but I'm pretty sure that it seemed so potent because it was cut with some antihistamine or other sedative. Didn't really make me itchy or nauseous, which good dope always does.
>
> Forum user 'Benzobeatz'

In this and similar accounts there is a direct link drawn between genuine, rather than apparent, potency and negative effects. In other cases, risk is a measure of potency: the stronger the drug, the greater the danger. The positive association between risk and effectiveness has been noted in relation to pharmaceuticals as well as recreational drugs (E. Martin, 2006). Likewise, a heroin high that felt too 'clean' could be taken as evidence that it is adulterated and ultimately less effective. On the other hand, many more sought the smooth, untroubled high as a sign of purity. Decorte (2001) suggests many users mistake side effects as signs of adulteration and so a high that feels pure is likely to be from a drug that is much less than chemically pure. Different dynamics and expectations existed for different drugs. Heroin purchased on the darknet is expected to be higher purity than street heroin, but also to cost more. Cheap heroin is suspect as likely to be cut. Cannabis is expected to be significantly cheaper for the quality compared to off-line markets. Many heroin users were willing to pay more for reliable quality. Heroin users adhered more to the idea that the drug has a set of consistent qualities that are hidden by adulteration, whereas cannabis users had a greater sense of the drug as multiple, and could perceive high chemical purity as working against its effectiveness.

DOSING AND THE USER'S BODY

The users' embodiment–their awareness of the body as an instrument and mediator of experience - is the focus for several different kinds of knowledge which are used and shared. In relation to heroin, it is recognised in how the drug responded differently depending on the user's tolerance:

> If your H is rubbish and you've not been doing opioids like oxy [oxycodone] or subs you will have low tolerance. Take the right dope and a small dose, fifty to seventy-five milligrams, and you'll have a mid-range high. Stick to less than a hundred mgs until you're sure of how the H you have works on you. Take care if your tolerance depends on rubbish dope. It's about how your body handles it and you're the only one who knows that.
>
> Forum user 'Snarkfish'

Tolerance was represented as an attribute of the user's body that they had to be aware of and use both to assess drug quality and properly titrate their use. It also is acknowledged in advice about dosing. The view that 'everyone is different' prevailed, and general rules of thumb are given out by users to advise on what might be expected at different doses. Users share advice on titration, discussing how to produce different kinds of effect with heroin using varying dosage and different injection and smoking techniques.

Users advised others to test small amounts of heroin to gauge quality in relation to tolerance

> I expect you'd be okay taking one third of the bag, but it might make you sick if you have a low tolerance. In that case, best to snort a few bumps to test the strength. With a new batch I take small test shots or bumps. You won't waste much that way.
>
> Forum user 'Minajatrois'

In this quote and many others there is an understanding of tolerance as embodied, and that the user's own self-understanding is crucial to a successful and safe drug use experience. Pleasure was embodied and could be experienced at different stages of drug consumption. It could come in preparation and/or anticipation, such as watching the flow of blood into the syringe when a vein is reached. A clean high is sought, corresponding to the drug's appearance of physical purity. A combination of colour, smell, texture and form signalled quality. In the case of heroin, users looked for various attributes: whether it 'crunched' when cut, how it flaked, its colour, and when cooked whether it turned into a clear golden liquid.

> Is it lab grade? Maybe not quite there but certainly among the top gear and purest you can get. It's a beautiful white, when you put it in water it dissolves away completely, and it draws into the syringe nice and clear. Gives me that warm, pinned feel.
>
> Forum user 'Fakepants'

Impurities were 'dirt', in the sense of matter out of place (Douglas, 1992). Dirt could include a physical residue left after dissolving heroin to inject it, or bodily reactions such as coughing and hacking. Side effects could be interpreted as dirt or could be taken as a sign of chemical purity. In this case there is a difference between more casual users - who saw side effects and comedowns as unwanted dirt contaminating the desired experience - and more regular and experienced users of cocaine and heroin, who saw side effects as a signal of potency and effectiveness.

There is recognition of technique of injecting or smoking as part of the user's embodied disposition. Users share these techniques and judgements to evaluate the desired qualities of different vendors' products. Vendors make a greater contribution to these discussions, often defending the process by which they make claims about drug purity. This kind of knowledge is open to challenge. For example, vendors may suggest that critical users do not have the street experience to judge. Vendors and some more experienced forum users saw their role as policing some of the knowledge claims made about product quality and acted in the forum to shut down opposing claims.

CRAFT AND CHEMICAL

Drug testing is an expected part of market practice. Users of drugs purchased off-line rely on craft and folk knowledge to evaluate quality (Decorte, 2001). They make judgements of quality based on colour, texture, smell, and structure. As mentioned

earlier, in off-line markets these judgements are often uncertain with limited opportunities for comparison and verification (Evrard et al., 2010). We distinguish between empirical craft knowledge - that emphasises tacit judgements learned through direct interaction with the drug and its production and consumption process – and chemical-scientific knowledge that makes claims that are theoretically independent of users' judgements. Scientific knowledge like that derived from chemistry claims a greater degree of abstraction and authority than craft knowledge, while craft knowledge emphasises its practical applicability. Both of these lay claim to higher status than 'mere' embodied experiential knowledge. Expectations of the application of both judgements were explicit in many listings. Drugs were sold with the expectation of applied craft preparation, such as freebasing cocaine:

> I sell clean, top alkaloid cocaine. Its purity is around 80%plus. It has made its journey from the jungles of Peru, via the Carib and finally the ports of Europe from where I send it round the globe. It's light on the nose and it's simple to make hot free-base coke. If you clean it with ammonia there will be no residue left behind.
>
> Vendor 'ShakeIToff'

There is extensive evidence of craft and folk techniques being highly valued. Being able to assess weight visually is one:

> The coke turns up lumpy with some powder. Tastes, feels and smells like the real thing. I didn't weight it but a quick eyeball and it was one gram at least. You'll hear more when I get time off work to take it for a test run.
>
> Forum user 'Kirknspock'.

'Eyeballing', assessing weight and quality through sight alone, is a necessary skill when kitchen scales will not accurately measure at the scale of a gram and fractions of a gram.

These folk testing techniques blurred into scientific-chemical ones so should not be seen as wholly separate. Some of the separation comes in the kind of equipment and language people assemble to make these judgements (for example, using beakers to create an ammonia wash) and this lends to it a more science-like air.

Feedback from chemists is relied on:

> I'm a research chemist with the equipment and the training to test drug purity. I have bought different gear off the darknet for more than a year and a bit, good and bad. I have to say that [vendor] Moonface is the only one whose coke hit over ninety percent pure.
>
> Forum user 'Fatlad'

The ability to use and interpret a test does not necessarily require theoretical knowledge. One forum user offered to have samples of cocaine tested at public labs in Europe and posted the results on the forum. This got round the problem of public drug testing facilities in many European countries only allowing for in-person testing. The status of chemical knowledge was contested. For some the 'final word' on a discussion of purity is that of those who use chemical tests. Others, such as a user running an independent cocaine testing service, stressed that lab tests only reveal the chemical makeup of that specific sample, not the vendor's entire product line, and that a test would not reveal how the user would respond to the drug. Proper dose-testing procedures should still be followed. Despite the salience accorded to lab tests, from the discussions it is clear that the worth of the drug is assessed in its subjective uses that are in some cases at variance with its chemical purity.

There was a tension here between the subjective experience of using the drug and the objective knowledge derived from craft and chemical testing. What users were doing was employing these different kinds of knowledge to define the drug as coherent and stable. Tests, pill reports and dosage techniques were part of the drug assemblage. Users were aware that an effective drug had to be produced, sometimes by adulteration. The 'true' drug, in the sense of the ideal, effective, and predictable substance, then, is not always the chemically purest one and, in any case, many drugs are composed of several active substances. A skilled vendor could produce the desired drug though judicious adulteration or purification. In this they acted like a producer in a taste culture, their 'cooking' culturally transforming the 'raw' drug into its true self (Vuolo, Uggen, & Lageson, 2014).

Users constructed some drugs (including cocaine, ecstasy, and amphetamine) as more artificial and amenable to chemical testing. In contrast, cannabis is treated more as a fine wine, less amenable to scientific prodding and poking and with secrets open only to the experienced connoisseur. It is viewed as a drug that needed more experiential knowledge to judge, assessing the kind of the high and the subjective effects it produced. Overall the more risky the drug is perceived to be, the more potent it is thought to be, and the more testing is needed to verify its purity and quality. In those cases users relied more on chemical knowledge. In contrast, cannabis was presented as a drug that could only be evaluated through experiential knowledge and to some extent users resisted ideas of quality that relied on chemical testing of purity

DISCUSSION

In common with other drug users, darknet users' understandings of product quality depended on their experience, the purpose of use, and its context. Effects are generated in a practical, structured embodiment (Vitellone, 2015). Desired effects are set against judgements of safety and predictability (Sheridan & Butler, 2010). The understanding of quality as potency (Reuter & Caulkins, 2004) is of keen interest to drug users (Reinarman, 2009) and features in public and scientific discussions of drug risk and control. However, these questions are not just ones of achieving customer satisfaction. They are political, in the sense of being used to promote particular agendas and positions. Purity is presented as a coherent, testable attribute in policy and media discussions– whereas users find that purity is multiple (Duff, 2013). Claims about drug purity became a live political issue with the 2009 reclassification of cannabis in the UK. One argument put forward in favour of moving cannabis to a more restrictive classification was that the drug had changed, becoming more potent and increasing the risk of psychosis due to strains being bred with higher tetrahydrocannabinol content (Monaghan, 2014). In that debate, purity was reduced to, and equated with, danger (Di Forti et al., 2015; Office of National Drug Control Policy, 2004). Public health bodies promote the view that adulterants are the cause of adverse and unwanted effects (Harris, Forseth, & Rhodes, 2015). In the case of illicit drugs, both purity and impurity are therefore defined as drivers of harm (Scott, Caulkins, Ritter, Quinn, & Dietze, 2015). However, this is not a simple cause and effect relationship. An analysis of literature from the Europe and the USA show that changes in chemical purity are not strongly associated with opioid overdose deaths (Darke & Farrell, 2014).

There are two implicit claims at work in discourse on drugs in the darknet that we have sought to open up. It is assumed that purity is the measure of a drug's desirability and that darknet markets make purity transparent. We sought to test these two claims. There are three apparently coherent concepts around which users make judgements about product quality: purity, embodied experience, and craft/chemical knowledge. We have

shown how each is enacted and shared. Users' ability to integrate different forms of knowledge about drug quality is essential to successful judgements about product worth and assembling the drug as a usable, culturally tangible object. Users' ideas of desirable effects depended on the purpose for which they were using the drug. Reliability is prized both in terms of the drug acting consistently and being delivered through the post on time. Users establish discussions about quality as their establishment of their position as drug users.

Transparency is not automatically produced by the market and vendor listings, nor reducible to any single attribute of the drug such as its chemical strength or degree of adulteration. Judgements of quality are co-produced between users and vendors. The darknet market creates a setting where drug users discuss product value and quality. They use the forum to compare notes between vendors and between batches of product. What is novel is the ability of users to employ different kinds of knowledge to assess drug quality. The process of judgement is a key part of assembling the drug and its context (Duff, 2011). Users had preferred methods to do so: chemical tests, 'taste' abilities, and comparing notes with others on-line and off-line. They balanced various factors from expected to actual effect to comedown and how the drug interacts with other drugs. Most notable is the dissemination of craft and chemical expert knowledge. This has always been part of the dealer armoury and is now disseminated further by expert buyers acting as key knowledge nodes. Developments in technology allow for technical assays to be made. This adds another kind of knowledge into the assessments of drugs. It is in contrast to how scientific knowledge has been seen in other contexts as working against users' own concepts of drug use and experience (Letcher, 2007). It is made explicit in how drugs are sold, with different grades of some drugs offered by the same vendor at different rates.

We have argued in this article that the different capacities of darknet users allow rapid assessment and comparison of chemical purity. Darknet users integrate this knowledge systematically into their own drug use. Referring to chemical knowledge as the final word changes their understanding of what a 'good' and a 'bad' batch is and encourages users to focus more on purity. It also gives them a consistent, high status language with which to describe their drug use. Chemical purity, though highly valued, is not the sole dominant evaluative standard. It takes its place with other kinds of knowledge and dispositions towards drug consumption. Dealers and users may not value purity directly but instead the combination of adulterants that create specific effects (Coomber, 1997b), lasting effects which can be combined with work or social life, or the readiness of the drug to be repurposed into another form. Subjective potency may, then, only be loosely related to purity. This may be one reason why users find pharmaceutical heroin unsatisfying compared to street heroin (Vitellone, 2003). We do not want to overemphasise the distinction between street and darknet markets. Many of our interviewees still bought on the street market and some of the customer orientation identified in the darknet is also present in the street market, where dealers compete with each other and offer incentives to users to switch (Coomber, 2006). In contrast to research with users who purchase drugs in some off-line markets, our research has shown darknet market users to be more confident to probe and question claims made about quality by vendors. Vendors are pushed to make and justify quality claims. This indicates a shift in user comportment and power. They are employing these kinds of knowledge to evaluate drug quality and sharing this knowledge with peers in the market forum.

We have confirmed and elaborated on previous research that has explored the operation and shape of the darknet markets, which uses them and their motivations (Barratt et al., 2014; Buxton & Bingham, 2015; J. Martin, 2014; Van Hout & Bingham, 2014). Our study has illuminated the ways users produce the markets through their sharing of information and evaluation of quality using various knowledge forms. These can be thought of as examples of peer harm reduction (Parkin, 2013; Parkin & Coomber, 2009). For many users, discussions about quality embedded harm reduction as a normal practice. This is not confined to stereotypically recreational drugs such as cannabis and ecstasy. There is a lively discussion around heroin, opioids, and methamphetamine on the forum. Use of these drugs is typically associated with chaotic lifestyles. However, many forum users were in relatively stable circumstances, including in employment. The 'healthy heroin user' has been identified in other studies (Shewan & Dalgarno, 2005). Buying heroin on the darknet had the advantage of fitting in well with their lifestyle and they looked for qualities in the product and delivery of it that would fit with their social obligations.

Users can benefit from more systematic sharing of knowledge about product quality and risk, which the darknet partly answers. The sharing of experiences and different forms of knowledge on the darknet forum points to a potential for harm reduction: different kinds of knowledge are employed to assess the quality of various products. Users share peer harm reduction advice covering dose titration, integrating or avoiding polydrug use, interpreting side effects and testing purity. Inconsistencies and other problems can be reported quickly and information about effective and safer production and consumption techniques are shared. The next step is whether public health initiatives can convincingly engage with forums like this in promoting harm reduction.

Possibilities for doing this are:

- Using cryptomarket forums to distribute harm reduction advice and promote services.
- Establishing a presence on market forums to comment on harm reduction topics as they arise and validate users' own peer practices.
- Providing ways for vendors to add harm reduction advice to their listings.
- Posting drug alerts on related forum threads.
- Using trusted, encrypted communications systems to provide secure, confidential advice to users.

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