Philosophy of Photography Vol 2 Number 1
 Doi:10.1386/pop.2.1.153_7

Encyclopaedia

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Dosimetry, Personal Monitoring Film

The photon that […] *alters the halides of the film is not really a substance and it does not produce an impact. It carries energy, but has no mass.*
Henri Van Lier *Towards a Philosophy instigated by Photography* (1981)

In the specialised field of Radiation Dosimetry ordinary photographic film, albeit with a two-sided slow and fast emulsion, known as Type 2 Monitoring Film (Kodak®), is used for the detection and measurement of harmful ionising radiation. The demise of this technology allows one to consider its broader implications in relation to Van Lier's critique of photographic indexicality.

Radiation dosimetry monitoring began in the 1940's and involves a person 'wearing' a piece of film in a light-proof film-holder called a dosemeter for anything from an hour up to one to three months at a time, in order to monitor their exposure to radiation. Even Homer Simpson, worker at the Springfield Nuclear Power Plant, has been spotted wearing a monitoring film badge.

The design of dosemeters has taken into account the wide variety of radiation sources employed in industry, research and the medical world. A dosemeter can contain various filters made from duralumin, cadmium, a tin/ lead combination and different thicknesses of plastic, as well as an unfiltered area. These filters will shield the film by absorbing some of the incident radiation, and thus provide the analysing scientist with data from which energy and radiation type may be concluded and, most importantly, reveal a radiation dose result. A standard Densitometer which measures the optical density of film or prints when used by film processing/printing professionals, is also used in a scientific context to provide similar data, albeit calibrated to what is known as a 'traceable standard' set by the National Physics Laboratory, who agree the numerical standardised units of measurement in this context. That is, the dark-to-light densities of exposed film are measured. The darker the exposure, the more radiation is detected.

Film is only one type of radiation monitoring technology from a range of thermo-luminescent, electronic and optically stimulated luminescence, and dosimetry is one of the last areas where film is used in a medical or scientific context. When Kodak cease production of Monitoring Film in 2011 it will be superseded by other monitoring technologies. The parallels between the light-proof dosemeter and a film camera are what makes this technology's impending obsolescence worthy of discussion now.

Furthermore, this obsolescence is significant in both theoretical and philosophical terms. The disappearance of film dosimetry comes at a time of renewed interest in camera-less photography. The person with a dosemeter is like a walking 'camera' – reminiscent of wearable imaging technologies – which, although rigorously pre-set with filters, allows an undirected or unintentional long-exposure negative to be contaminated by the more energetic end of the electromagnetic spectrum in the wearer's (usually immediate) environment. The social phenomenon of a fascination with retrograde technologies such as pinhole cameras, for instance appears commonplace enough. But the issue here is not so straightforwardly aesthetic. For physicists involved in radiation monitoring, dosimetry is valued not for the image it produces but as a health and safety tool that is part of a finely calibrated measuring system. However, it is significant that the demise of personal monitoring film can be aligned with the demise of indexical theories of photographic film in general, for here is an excellent example of the notion of the index operating at a scale of atomic particles that allows a fresh perspective on over-rehearsed arguments about the photographic index. Often described as a 'photonic imprint' (Van Lier), or the trace of a photon particle making contact with film, indexicality has come to stand, in general, for the 'causal relation' thought to lie behind any photographic image. The idea of being *touched* by another photographed person, for instance - the confirmation of physical presence in the 'that-has-been' - secured the purchase Barthes's thought photographic indexicality had on truth claims deemed inimitable to the photographic. Yet, such familiar confidence in the power of the index, so conceived, founders when we include consideration of the wider electromagnetic spectrum.

Van Lier's *Towards a Philosophy instigated by Photography* (1981), offers an incisive critique of what he calls the infatuation with the 'index according to Peirce' (under which heading it has become customary to collect all strong claims on photographic reference, including Barthes's) Van Lier's critique is unambiguous in this: 'All the inexactitudes in theories of photography can

be attributed to the rash overlooking of the strange status of those very direct and veritable luminous photonic imprints, which are but the very indirect and abstract imprints of objects'. (1981)

Van Lier's critique hinges on the accuracy of attributing such significance to what is an energetic phenomenon. As indices are not yet signs, for him, they remain of the order of the *littoral* rather than the *trait* (as appears for signs). Thus, he argues, they are better seen as being in 'continuous *overlap*' with and 'problematic *emergence*' from their background. In other words: 'information is rendered as emerging fragilely and problematically out of noise, *background noise'.* It is this quality in particular that prevents the dosimetry film 'images' from being images, pictures, or depictions at all, what spectacle there is, one might say after Van Lier, emerges from the 'non-spectacle'.

Van Lier argues photographs are as equally 'blurred' as they are 'clear'. Photographs preclude huge amounts of (dis)information as well as present abundant detail. However, the dosemeter 'image', if it is an image at all, is more clearly a strict replication of an image of its filters, which variously controls sections of the film exposure. We see the mechanism of measurement in image form. However, an abundance of the presence of ionizing radiation darkens the film and it is contaminated from its *immersion* in background radiation despite the metal and plastic filters in the badge. This reveals two interesting things. Ordinary film is sensitive enough to be exposed to the full electromagnetic spectrum and part of the abundant detail in negatives is their immersive exposure to other wavelengths of radiation, which are not visibly received, through the body of the camera. Secondly, a 'dosemeter image' emerges from a process of slow-exposure, from a person's multiple movements and activities and from multi-directional angles.

Why are indexical theories attached to the technology of film and what is the philosophical interest here? Primarily, Van Lier's view is that 'photography is able to capture the quantic character of the Universe by virtue of its granularity.' He goes so far as to say that 'the photograph is already philosophical by virtue of its granularity'. This reveals his position to be analytically oriented aiming, as it does, through the indicial to arrive at mathematical certainty ('The photograph, as a contingently indexed indicial imprint'). This is again reflected in the notion of a photonic imprint here when he says that not only can 'a photographic imprint […] be dated close to a billionth of a second' but that this happens as 'the last photon expels concrete *duration*, substituting it with a physical and exclusively datable time (tn)'. It is also

this impulse, no doubt, that motivates his reading of film itself, as producing analogical images which become, 'through the conversion of each single silver halidic grain governed by the choice between darkened/non-darkened, that is to say, a choice between yes or no, 0/1: therefore, [that] photographs are also *digital* (calculable)'. Film granularity is not necessarily analogue in nature.

However, dosimetry, though in the terms of Van Lier's critique of indexicality, reveals to us that energetic effects are, in a certain manner, always limited from a superabundant field. In photography as measurement degrees of film density or darkness reveal exposure to 'radiation'. Therefore, the measureable indexical limits of the image-signs are up against the waves of a littoral, indicial background from which they are 'problematically emergent'. Van Lier expresses something of the energetic features of this changing process, when he writes: 'The weightlessness of photons endows their inscriptions with a striking weightlessness.' Dosimetry reveals a wave phenomenon throughout and across any putative intentionality, or automaticity, that photography theory might reserve for the index, and this may well be an immateriality from which a theory of indexicality cannot recover. Dosimetry is a photography of the pure, and applied, mathematics of film contamination.

Finally, in non-representational terms, the situational camera from which any view is created is always subject to the peculiarities and circumstances of its own making, its biography, so to speak, the decoding of which is simply, and conclusively, unreadable. It all comes out in the wash.

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Acknowledgements
Medical Physics, Brighton & Sussex University Hospitals Trust