Affinity: characterizing and modeling the visual behavior of ASD people in presence of their affinity
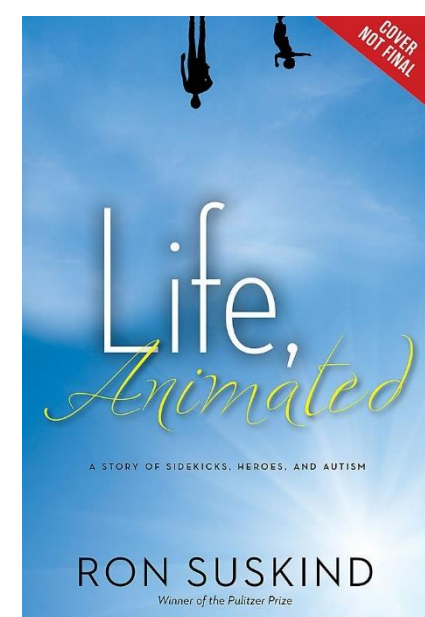
What is *Affinity Therapy?*

Most of people suffering from Autism Spectrum Disorders (ASD) **have a specific and personal interest in a particular thing**, such as a toy, a subject (e.g. traffic, plane…), an interest in cartoons or music to name a very few of them.

Affinity therapy exactly relies on such particular interest from which a **sustained connection between the autism's world and an exterior world can be made**.

This affinity, that used to be denounced as being an "obsession" or some "momentary fad", turns out to be **the main support for a treatment as an opening to the world**, to socialization and to learnings.

Research question

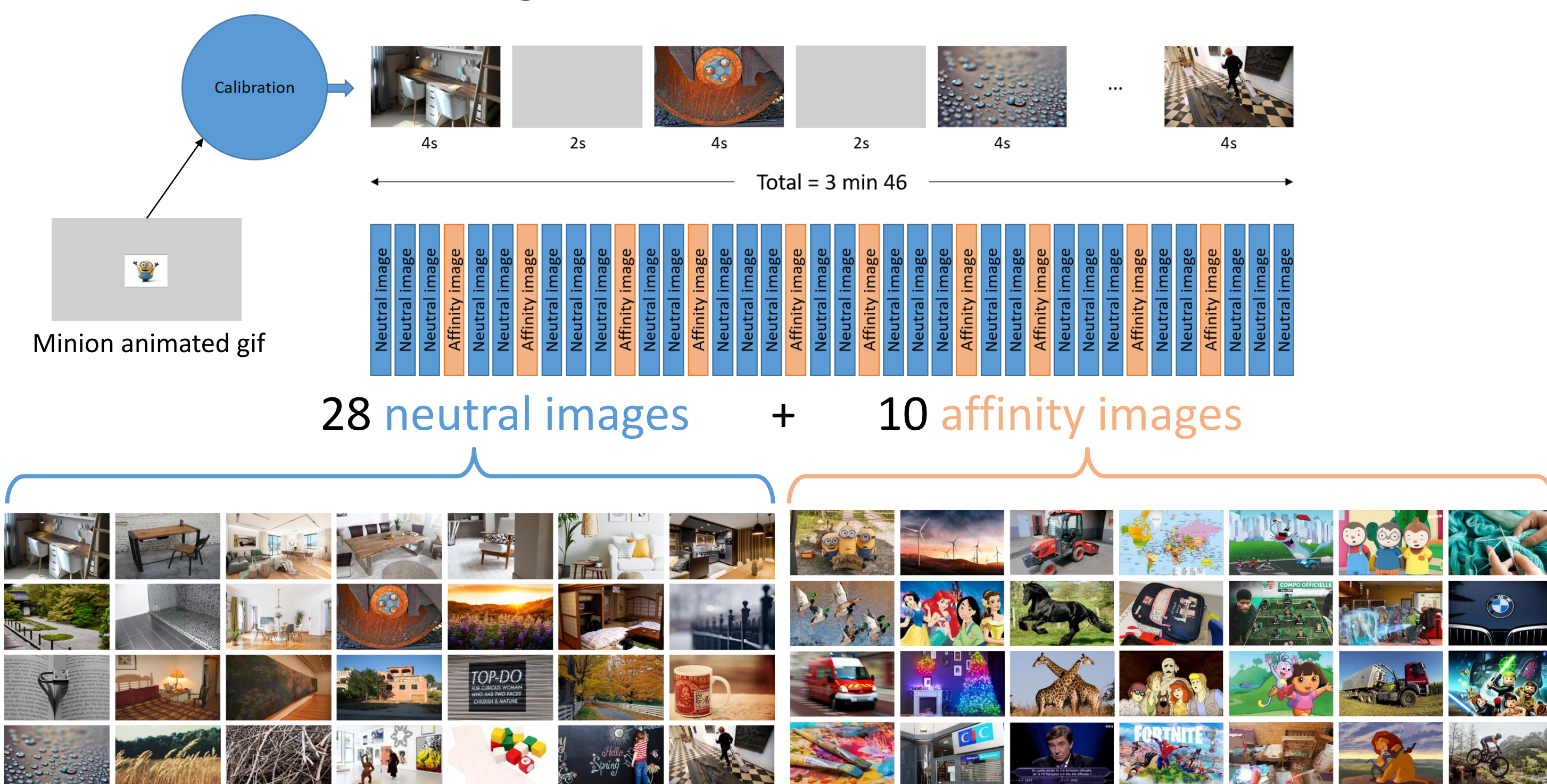*Can we provide evidence that the visual engagement of ASD people changes in presence of their visual affinity?*

Experimental protocol

1. **Two weeks of immersion in institutions that welcome ASD subjects**, for investigating the pattern of thoughts of each autistic mind which develops from a key that is said "affinity" or also, in psychoanalytic terms, "autistic border":
   - Joining and participating to their daily life;
   - Identifying subjects who might be part of the study with their affinities and collecting clinical data necessary to the experiment.

2. **Two weeks of eye tracking experiments and digital activity** to collect the data necessary to our study while providing an interesting and fun activity for patients.
   For the eye tracking experiment, we added a Kinect to the eye tracker to record the body movements as a depth video and the voice in addition to gaze data.

Calibration

Minion animated gif

4s | 2s | 4s | 2s | 4s | … | 4s

Total = 3 min 46

28 neutral images + 10 affinity images

This protocol has been applied in four partner institutions and involved 52 ASD subjects:

Institution	Participants	Age	[♂,♀]
1	15	16,1±3,2	[13;2]
2	16	36,25±10,25	[12;4]
3	13	11,15±3,53	[12;1]
4	8	15,62±5,78	[6;2]

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Results

1. **Clinical findings**
   - Observation: some subjects with ASD engage their gaze more when affinity is displayed while others withdraw it, or some mute subjects speak (sometimes addressed to a transference partner).
   - Clinical interpretation: The affinity image arouses interest compared to common images by engaging gaze or withdrawing it (distress), also it vitalized body through speech or movements.

2. **Statistical findings**
   - Affinity images are significantly more explored than neutral ones (shorter fixations, longer saccades) in the two first institutions.
   - In the other two, the trends were the same, but the results were not significant. Limitation: the subjects have several affinities, but only one was proposed in the experiment.

➡ **The affinity and its usage are always specific to each subject, and their individuality must always be taken into account.**
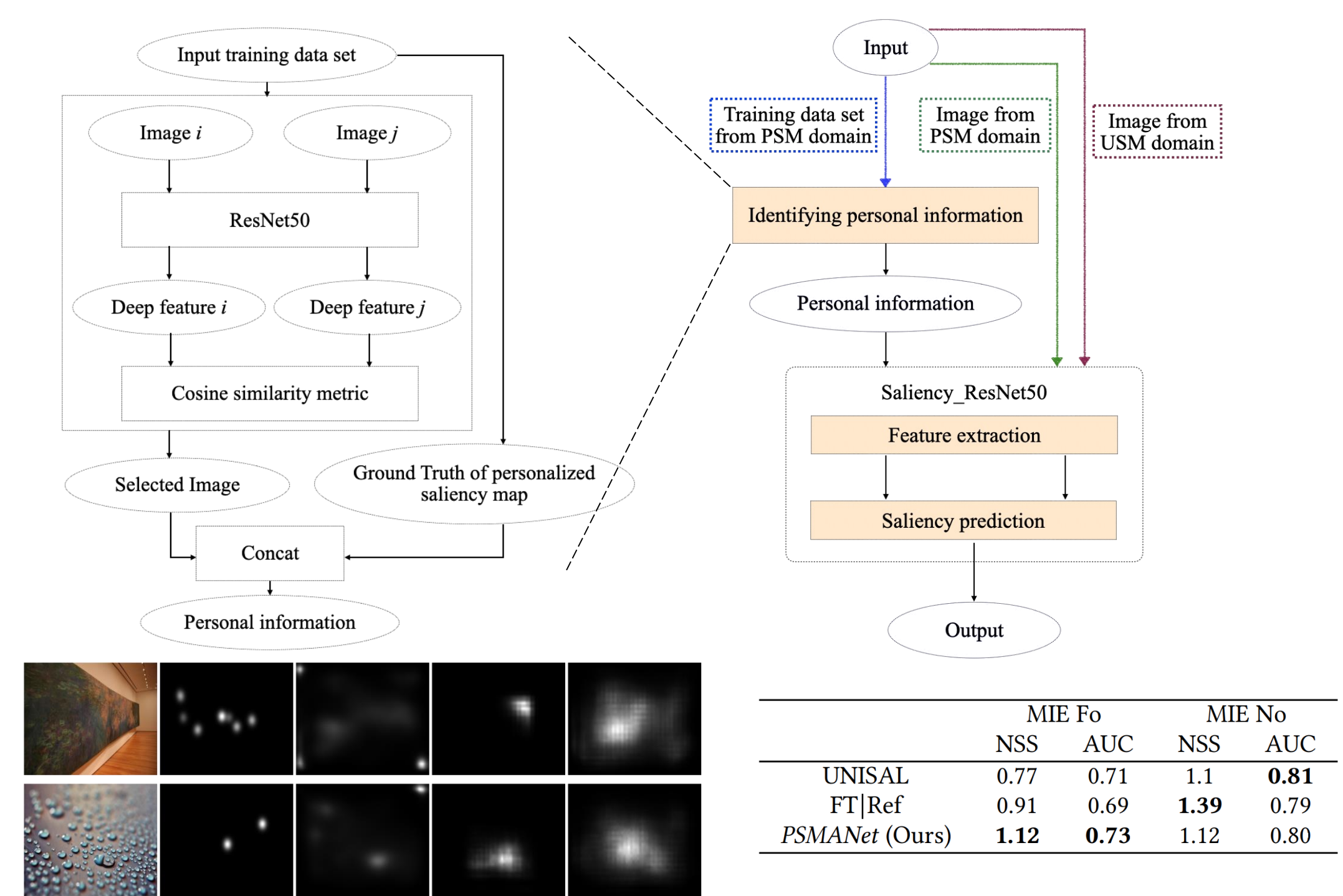
Clinical consequences : a Borromean knot ?

- The autistic people often say that they do not feel their body as theirs, as if it was additional.
- The affinity seems to allow the autistic persons to establish link with his body and the world around, opening them up to language and learnings.
- In psychoanalytic terms, we may say that affinity makes a knot between the body, and the different registers of the world that are the symbolic (S), the real (R) and the imaginary (I).

Affinity ?
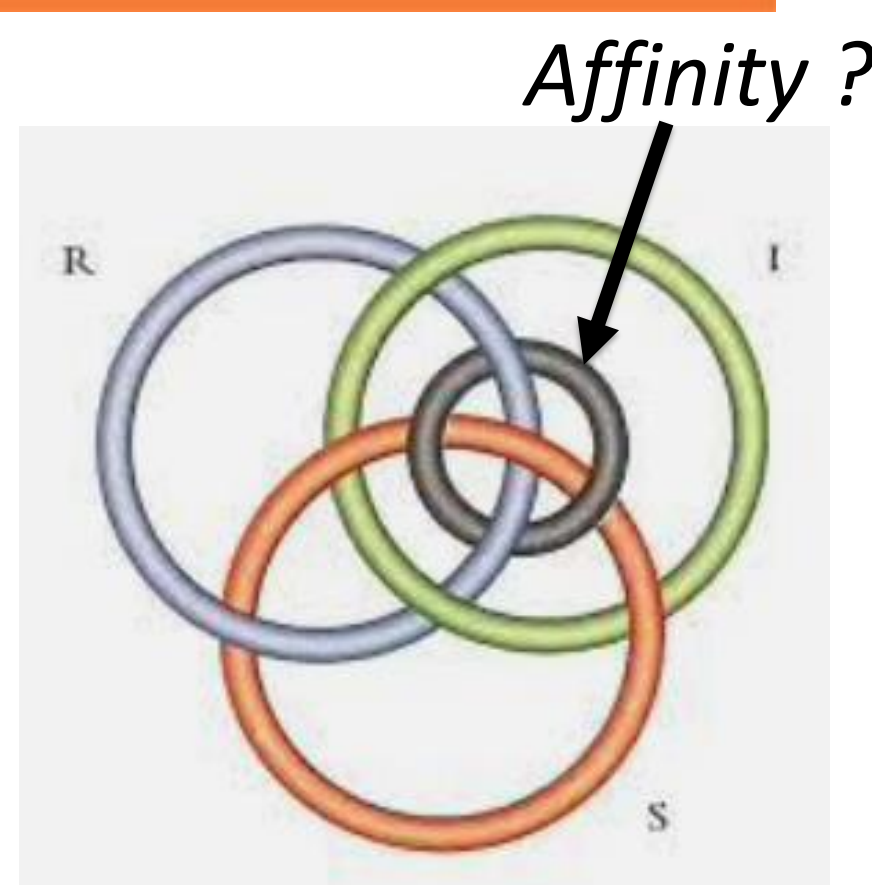
Personalized saliency prediction

As the visual behavior is very specific to each autistic subject, we aim at create a saliency model able to predict the personal gaze without retraining it for each subject.

	MIE Fo		MIE No	
	NSS	AUC	NSS	AUC
UNISAL	0.77	0.71	1.1	**0.81**
FT]Ref	0.91	0.69	**1.39**	0.79
PSMANet (Ours)	**1.12**	**0.73**	1.12	0.80

Scenes | GT | UNISAL | FT]Ref | Ours

We hope to improve our model by using affinity images as embedded personal information.