Testing the Bond: 
A Study of Stickers on Contemporary Artwork 
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Introduction

• Research must be done to determine the long-term effects of stickers on their support. 
• Deterioration could occur, such as yellowing and brittleness, for both the support and the sticker itself. 
• This research study focused on observing the possible deterioration between the stickers and the support.
• Numerous tests were performed on unaged and aged replicas.

Experimental

Material:
• Self-adhering labels on top of the following substrates: Silver gelatin print, Canson and Strathmore papers
Sample Preparation: exposure to: 65% relative humidity and 80°C for 28 days.

Method:
• Visual Assessment: yellowness, brittleness and delamination.
• Removability: mechanical removal of labels, different percentages assigned.
• Fourier Transform Infrared (FTIR) spectroscopy analyzed stickers, labels and unaged and aged samples
• Photographic Activity Test (PAT) at the Image Permanence Institute (IPI), Rochester, NY. The samples were placed in a humidity cabinet at 70°C and 86% relative humidity for a period of 15 days. (ISO 18916 (2007))
• Peel Strength Test: at the Canadian Conservation Institute (CCI), Ottawa.kg measurements (ASTM: D6252/D6252M)
• pH Test: cold extraction method. Ratio of 1:70.
• Colorimeter Test: Minolta Chroma Meter, CIE standard LAB L*a*b*

Results: pH Test

Silver gelatin samples: similar results after 1 and 72 hours. 
After 1 hour, difference in pH of 0.05 
After 72 hours, difference in pH of 0.02 
Canson paper samples: difference in pH of 0.19 
Strathmore paper samples: difference in pH of 0.05 
The samples were always slightly more alkaline after aging 

Results: FTIR

Unaged and aged samples: very similar results
• No signs of cross linking or chemical changes
• Small change in absorption near 3000 cm-1 (Group D and F), due to adhesive residue on the paper

Results: Removability

• Mechanical removal of the labels 
• No use of solvents 
• Some samples showed failure of the bond on the substrate surface or the adhesive

Results: Peel Test

• The aged samples were always showing a higher kgf 
• Group A and B: difference of 0.16 (from 0.18 to 0.34 kgf) 
• Canson paper samples: difference of 0.41 (from 0.25 to 0.66 kgf) 
• Strathmore paper samples: difference of 0.22 (from 0.14 to 0.36 kgf)

Results: Colorimeter Test

Silver gelatin aged samples became lighter (ΔL* is greater than 0.5) 
Δa* is smaller than 0.5 in all the samples so there is no perceptible change in degree of red to green. 
Silver gelatin aged samples have yellowed (Δb* is greater than 0.5) 
ΔEab* =1 for the adhesive side of all the samples and for the silver gelatin emulsion side so there is an overall perceptible change in color in these groups.

Conclusions

• The chemical properties of the substrates did not change while in contact with the label during aging. The adhesive did not release any products that might have been harmful to the substrate. 
• The aging of the paper in contact with the label did not cause changes in pH, therefore the paper did not become more acidic or more alkaline 
• The results show that in all the cases the force required to pull apart the labels and the substrates was always higher when the sample was aged. 
• The aging caused the adhesion between the labels and the substrates to become stronger. 
• The labels do not seem to be damageable to the papers but seems to be the silver gelatin photograph.

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Background image: Astman, Barbara. “Ian and Barbara with Animals in Jungle”, National Gallery of Canada